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EUGENICS

SCIENTIFIC GENERATION

—OF—

HUMAN OFFSPRING.

Principles and Material Basis

—OF—

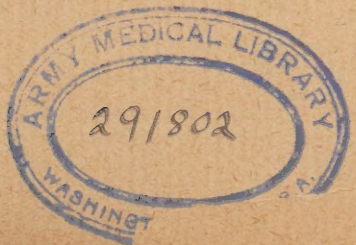
HEREDITY

AND

PRENATAL INFLUENCE.

—BY—

HENRY W. FRIEDHOFF.



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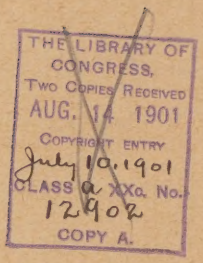

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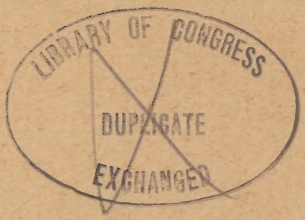

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PRELIMINARY.

DESIRE FOR IMPROVEMENT.

The human being, at whatever plane of development, in whatever circumstances of material welfare and at all stages of life's uncertain span is imbued with a persistent desire for improvement. We continually wish for improvement in ourselves and in our environments. This ever present desire we fondly hope to realize at some future time, some indefinite "tomorrow." The chubby infant stretches out its awkward fists for the bright bauble just beyond its reach. The boy wants to be tall and strong like his "big brother." The youth impatiently looks forward to the time when he can conquer human frailties and fight the battles of life with the strength that will be his "when I am a man." The young man, finding that the legal age of citizenship does not bring a sudden revolution in moral and physical powers, is sure that he will accomplish better things when a few more years of development shall have

made him "mature." Man in the prime of life and strength, finding his accomplishments to fall so short of what he had anticipated, is pleased to think that advancing years, with the wisdom that comes of well considered experience, must finally bring the fruition of his earnest labors. The man full of years, crowned with the snows of many winters, with step less firm but mind more calm, looking back upon a life well spent, longs perchance for a period beyond life's short span in which to continue his unfinished task, saying with Newton: "I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me." Ever longing for something better tomorrow, ever hoping to obtain what will make life more worth the living—by and by! This has been the world's salvation, the cause of all improvement, the first step to all advancement. However often effort seems fruitless, we try again, hoping perchance for "better luck next time."

Few persons need be reminded that "luck" is

but a hollow term, expressive, at best, of events whose causes we fail to recognize fully. Most persons know that nothing takes place accidentally, spontaneously; we know that every event has been caused by something. We may not always know the cause but we are sure there is one. A building is on fire—how did it start? A boiler explodes—what caused it? Whatever may remain unknown about it, we are sure that there was greater steam pressure than boiler resistance. We need not be told that nothing ever just happens. But most of us do need to be reminded that NO ACTION STOPS SHORT, that every event has an effect, that whatever takes place exerts some influence on coming events. Moreover we have learned that UNDER THE SAME CONDITIONS, THE SAME CAUSE ALWAYS HAS THE SAME EFFECT. There is no chance, no luck, no accident, nothing haphazard about it. The recognition by the human mind of the universal and eternal law of cause and effect was epoch making in human evolution, as it is exceedingly influential in the history of each individual. It is the transition from darkness to light, from want to wealth, from helplessness to power. By its light the slave of chance becomes the master of destiny.

For man, having observed that certain results have always followed particular causes and conditions, when he desires a certain result, he does not merely wish or pray for it; he reproduces such causes and conditions as he has found by experience to have been followed by the results he desires. To be sure, all necessary causes are not always at our command—many are not even known. But we make use of those within our reach. For instance, a farmer desires better crops to enable him to build a better house. Suitable soil, good seed, proper cultivation, rain and sunshine at proper times are conditions and causes of good crops. With knowledge and diligence the farmer can select the soil and seed and can attend to the cultivation. Rain and sunshine, though governed like other things by cause and effect, are as yet beyond our control and for them he must rely on what to him may seem chance—or Providence. So, with faith in the law of cause and effect, putting brain and muscle to work, the farmer generally harvests a good crop, and by and by the better house that he wanted is built. The mechanic, the merchant, the manufacturer, the lawyer, the physician, the artist, the

statesman, the teacher—all wish for better circumstances in the future. How can they secure them? Not by wishing. Each, knowing that his activities are subject to the law of cause and effect, puts forth such efforts as, to the best of his knowledge, have always been the causes of good results in the world's experience—honest work, square dealing, better goods more economically produced, more learning, greater skill, greater wisdom, with diligence, perseverance and patience for all. If, after careful planning and diligent effort, the desired results to not follow, we may be sure that some necessary cause or causes were lacking and it is part of life's business to discover what they are and apply them.

It is the universal story, toil today in order to enjoy tomorrow. To be sure, for many that tomorrow never arrives. Having by labor obtained the means for better living it simply serves as an incentive to another effort for further acquisition for enjoyment in a still more distant future and so on repeatedly till acquiring becomes a habit. What was at first pursued as a means of enjoyment (material wealth) becomes the end or object of all effort. In-

deed some declare that there is more enjoyment in pursuit, in acquiring, than in possession or spending of riches. Be that as it may, the history of the individual is ever striving in the present for better conditions in the future.

Whether the immediate object of his endeavor, better material conditions, be attained or not, the law of cause and effect, always in force, does not allow his efforts to be fruitless; effort must and will have effect. One inevitable, in fact the most valuable, consequence of all proper endeavor is GROWTH —the striving being grows better, stronger, broader, deeper, grander, abler to comprehend and appreciate his environments, able perchance to hear "sermons in stones" and see good in everything. No effort is lost. Its immediate and never failing effect is upon him that makes it; its more complete fruition may come, through him, upon generations yet to come.

THE AUTOCRAT OF THE HOME.

The child is its parents' best "tomorrow." Present endeavor for future benefit of the individual is transformed into more intense endeavor of the

parents for the benefit of offspring. Personal ambitions are forgotten, personal comfort is not considered, personal weariness is ignored, personal improvement is often (unnecessarily) neglected, health is put in jeopardy, every promising agency within reach is laid under contribution at the first appearance on life's stage of the autocrat of the home, the baby—the parents' first "tomorrow."

Love and care of self has grown to the "broader selfishness," love of family, considered by many writers the first step in social evolution—the next step being the combination of several families for mutual help and protection in chase and war. Then came tribal bonds whose basic ethical rule is "to injure a member of our own tribe is a crime, of another tribe, a virtue." By and by we grow to the broad selfishness of patriotism, the love of nation, the inspiring theme of song and story. Shall we stop here and call this the highest possible stage of social evolution? No man liveth to himself alone—nor any nation. Telegraphs and railroads and steamships are not merely so much metal and wood and energy as agencies of commercial intercourse. They are "living tissue" binding together and uni-

fying the social fabric of humanity. We are beginning to understand that the misfortunes of any one nation can not be a lasting benefit to any other nation, that one nation cannot help itself by injuring another. The ravages and destruction of war are excusable only when viewed as the only means to quickly end a quarrel between nations. After the heat of action the conqueror may well regret the necessity of his adversary's loss and injury, and endeavor to bind up his wounds. The civilized world today is indeed a family whose members are the nations of the earth. Whatever injures one member eventually injures all. National power finds its best and most profitable employment, not in ruthless conquest as of yore, but in the protection and uplifting of the lower races. But the nation that persistently ignores the just rights of other nations or of aliens within her gates, that refuses to see good beyond her own boundary or in customs other than her own, that spurns the ever growing and interlacing social bonds of humanity, in a word, the nation that, herself unwilling to advance, obstructs the world's progress in social evolution, that nation will in the end be overwhelmed. With nations as with indi-

viduals it is, learn the laws of nature and live in accordance with them or suffer, advance or perish.

But to come back to our autocrat the rosy dawn of a promising "tomorrow." Every new phenomenon that it exhibits is an interrogation point for the observer. Baby's appearance may well cause peasant and philosopher to ask what is it? Whence? Whither? No one ventures a complete answer. It is a bundle of possibilities! Some day that mouth with its active tongue may give vent to instruction or to deception, may praise or blaspheme, may sing or curse, may carol with joy or groan in mental agony, may assist with honest advice in the council of the nation or carp at the best endeavors of its earnest though finite servants.

Whence? Without further investigation, aware that every phenomenon must have an adequate cause and knowing that the child is the offspring of its parents, we can safely assert that everything in the new-born child is derived from, was contained within, its parents. *Ex nihilo nihil fit.* Parents cannot give to their offspring what they themselves do not possess *in some form.* But whether they must share with their child all they

possess—whether they must give the good and the bad—that is a question. Whether parental characters are transmitted to offspring in the same degree as possessed by the parents, that is another question. Whether (in addition to the parents' inherited characters) the characters that the parents acquired by exercise during their own lives—whether these too can be passed on to their offspring, that is still another question. These questions it is our object to investigate.

Whither? Through frolics and colics of babyhood, through the joys and troubles, the mud pies and stubbed toes of childhood, through the hopes and aspirations, the yearnings and aircastles of youth, the striving, the labor, the achievements, the failures, the ups and downs of maturity, the recollections and reveries of old age, and down through the shadows of the valley of death. This seems to be the natural course run by the individual human being in this world. As to a continuance of existence on the other shore of the river of death, that is beyond the scope of this work. We are concerned here with an earthly immortality, an indefinitely continued existence in this world.

EARTHLY IMMORTALITY.

The bodies of the children (who may mourn their parents' "death") are the living continuance of the bodies of their parents. This is an interesting and important consideration, nor need it be difficult to comprehend it. If a child were the offspring of a single parent (as is the case with some organisms), and if this parent could have but one child, the parent dying as soon as the child was born, we could more easily look upon such a line or series of ancestors and descendants as a single being which occasionally casts aside nearly all of its old body and grows anew from a small remaining living particle. But human reproduction is the confluence of two lines of ancestors—two individuals each giving off a minute living particle and these uniting to form a single offspring, the parents continuing to live while the offspring develops and in turn and in like manner reproduces. Though the surviving parental bodies eventually die, the parts of their bodies that developed into independent beings, their children namely, may continue to live and reproduce and so on indefinitely.

To help us understand this aspect of eternal

life on earth let us have a look at one form of death so common as not to be feared or even thought of. Consider namely that our bodies are dying *in part* continually, daily, hourly, every moment. Every muscular movement, every thought, every action whatsoever, is at the expense of some part of the body which part ceases to be living matter. Muscular tissue and brain and nerve substance by exercise are thus daily transformed from living (organic) matter to not living (inorganic) substance and removed from its place by the blood to be soon expelled from the body, each cast off particle being replaced by new living matter taken from the blood. So that the blood, the life fluid, is also the stream of death. Even the harder tissues, cartalege and tendon and bone, are thus gradually dissolved and replaced by new material. So that your present body is not in any part composed of the living material that constituted it some years ago. It is in every part a new body, built up piecemeal (born) by and in place of the old body that died piecemeal. However, THE ORIGINAL PLAN OF STRUCTURE OF THE WHOLE AND OF EVERY PART HAS BEEN APPROXIMATELY FOLLOWED, SO THAT THE MANNER OF ITS

ACTIVITIES DOES NOT SEEM TO HAVE CHANGED. Memory unites consciousness of past and present experiences and so preserves our personal mental identity. In the usual course of a lifetime an individual body has many new births; life is a continuous throwing off dead matter and taking on living tissue, waste and nutrition, dying and being born.

What waste and nutrition are to the individual, death and birth of individuals are to the race. As the new nutritive tissue of the body assumes the same plan as was that of the waste parts removed and consequently continues the same functions, so new individuals are constructed on essentially the same plan as the parents who beget them, hence we might expect to find that offspring inherit the specific and personal characters of their parents. This inheritance by the children of the physical and mental qualities of their parents must now engage our attention.

PART I.

HEREDITY.

Chapter 1.

THE UNUSUAL IN HEREDITY.

It is the unusual that attracts attention and awakens thought and discussion. The usual, the commonplace, is accepted without comment. The vagrant comet is gazed at most attentively and causes the popular tongue to wag and conjecture, while the grand and beautiful constellations that nightly illumine the heavens receive but scant note or comment. The very changes of the moon lend that reflecting sphere an importance that the unchanging sun, ever at full orb, does not obtain in our minds. So it is with the usual phenomena of heredity. They seem so commonplace that we accept them as we do the air we breathe. During untold ages man has been familiar with the usual repetitions of hereditary phenomena but his records on the subject are made up mainly of the unusual occurrences. He noted the occasional black sheep

of the flock, the giant or dwarf offspring of ordinary parents, the sixth finger or toe, the criminal offspring of respectable parents. These were noted and pondered and considered remarkable enough to be recorded, while the really wonderful phenomenon that the offspring usually resembles its progenitors caused little comment. That wheat of the Pharaohs, annually reproduced, should produce similar wheat at the present time, that the impression of leaves made in dim geologic epochs should resemble leaves of the same kind of trees today, that animals should always bring forth after their kind —that dog should always produce dog, similar in limb and organs, and all similarly placed, is not considered extraordinary. This wonderful working of nature, because so uniform and universal is accepted as a matter of course.

But imagine an Adam and Eve, creatures of an Almighty fiat, without instruction or tradition, without experience, hence without knowledge of nature's phenomena or the manner of her working. Now comes a startling event, the birth of their offspring, themselves in miniature! Into a world containing all manner of flying and leaping and creep-

ing creatures comes this little stranger to them, its tiny limbs unlike those of the animals of the forest but so like their own, the color and texture of its skin, the color and shape and general appearance of its eyes how startling their resemblance to those of its parents! What if, in addition, they could behold the inner structure—the skeleton, the blood-vessels, the nerves, heart, liver, lungs—all miniature but faithful copies of their own! To the anatomical copy add the physiological similarity and the wonder becomes tenfold. Then, as the offspring develops, to discover that its actions, even its thoughts are like the actions and thoughts of its parents—laughter and song, joy and grief, love and anger, so like their own! The wonder has become overpowering.

If perchance there should be a point of dissimilarity, a birthmark, say, or even a sixth finger, the difference would hardly be noted in the overwhelming wonder of the general similarity. But when generation after generation comes forth in the same manner the oft repeated phenomenon of similar reproduction ceases to be surprising and it is the occasional discrepancy that becomes the center of at-

traction, so that an obedient and reverent Noah may be astonished to find that one of his sons should be lacking in filial respect. We mark the circling eddies near the shore of a river and wonder how any of its water should seem to flow *up*, but neither note nor wonder at the steady majestic sweep of the deep swift current of the stream nor ask why the stream flows *down*. But in pondering the seeming upflowing of the eddy the inquisitive mind perforce learns the reason of the down-flowing of the current. In studying the seeming exceptions in hereditary phenomena we are led to a better understanding of the laws of heredity.

The activities of a watch may be described in two ways. One way is to explain that the hands move around, one twelve times as fast as the other, to mark upon the dial the passing minutes and hours of day and night. Occasionally, for some unaccountable reason, the hands move a little too fast or too slowly to correctly indicate the lapse of time. This is the way to tell what we see the watch do. Another way would be to accurately describe its structure, its mechanism, explain the interaction of springs, wheels, cogs and levers and show their

connection with the hands causing the latter to move over the dial. This would explain how the watch works. To apply the latter method to the study of heredity, to explain how, by what precise means, the workings of animate nature produce the obvious phenomena of heredity—the repetition of the same characters in succeeding generations—would require histology beyond the power of the modern microscope, a better understanding of physics and chemistry than man can boast of at present, and would possibly need the help of sciences yet unborn. Such considerations fortunately do not deter scientists from investigating the subject. Thankfully accepting the crude conjectures painfully gleaned by the dim light of the past they add the wealth discovered under the clearer light of modern scientific methods, to pass it all on as a heritage to coming generations of scientists who may then have the advantage of still better means of research. It is not man's office to make the final solution of all problems; it is his business to do the best he can. Modern scientific investigation has accomplished wonders in the realm of the infinitely small, the world of minute existences, formerly unsuspected, whose activities exert

a tremendous influence for weal and for woe upon all the other, the visible, plant and animal world. In our study of the problems of heredity we shall take the easier task for the present and observe what nature accomplishes, note what is on the surface, leaving the more difficult study of the means she employs for a later chapter. In the present task we shall take advantage of the work so well accomplished by M. RIBOT in his painstaking and exhaustive, classical work, HEREDITY.

Popular as well as scientific observation declares that "like produces like." To express it more conservatively, so as not to seem to ignore occasional seeming exceptions, let us adopt M. Ribot's definition of heredity as "that biological law by which all beings endowed with life tend to repeat themselves in their descendants." Man's physical and mental being has many qualities, many characteristics, some common to all men, some confined to a particular race, others peculiar to families or individuals. Can all these characters, physical and mental, general and individual, be handed down from parents to offspring, and if so, are they all equally certain of being so handed down? Ribot

has carefully collected the reports and conclusions of numerous investigators of past and present times and gives us the result in HEREDITY.

Chapter 2.

INHERITANCE OF ANCESTRAL CHARACTERS.

PHYSICAL CHARACTERS.

First we note that life is two-fold (a) the body made up of organs with particular functions, and (b) the mind, by which we are conscious of existence. Are the organs of the body and their peculiar manner of activities transmissible from parents to offspring? There is practical unanimity in answering this question in the affirmative. The external organs, limbs, trunk, head, nails, hair, countenance, expression, complexion, features, also the internal organs, form, size and anomalies of the osseous system, proportions of cranium, thorax, vertebral column, size, and excess or deficiency in number of the teeth, circulatory, digestive and muscular system, proportions of the nervous system, dimensions of the brain (size and form of convolutions),—all are admittedly transmissible. Not only their form and size but the peculiar characteristics of their mode of existence, as fecundity, longevity, liability

to contagion, muscular strength and skill, voice (stammering, nasal swang, lisping, loquacity), albinism, rickets, lameness, are transmissible. The nature of the being then as constituted at birth (as inherited from its parents—its congenital characters), is transmissible to its offspring.

But ACQUIRED CHARACTERS, habits or modifications contracted during life, are these also transmissible? Here the answer is not so uniform, some investigators asserting others denying their inheritance. Ribot judiciously concludes that acquired characters meet with two contrary tendencies, 1. a tendency to transmission (which succeeds where the environments are favorable to the habit), 2. a tendency toward a return to the primitive type (which succeeds where the environments are unfavorable to the habit). In a word, "heredity extends over all the elements and functions of the organism, to its external and internal structure, its maladies, its special characteristics and its acquired modifications."

MENTAL CHARACTERS.

An investigation of the heredity of mental characters meets with greater difficulties than does

the study of physical heredity. Bodily organs can be easily observed and parent and offspring forms can be readily compared, but for mental powers there are no philosopher's scales "by which qualities, feelings and thoughts we can weigh," so as to determine their relative preponderance in parent and child. Besides many mental characteristics do not develop early in life and later it becomes more difficult to determine in what degree they are due to heredity and how far education and exercise may account for them. These difficulties need not prevent a fair investigation and a just conclusion; they give occasion for greater care and finer discrimination.

It has long been held that the structure, the physical nature, of an organ determines its function, the manner of its activity—a change of structure necessitating a change of function. There is a growing disposition to reverse the relation, to hold that the nature of an organ's activity determines its structure—a change of activity causing a corresponding modification of structure. In either case there is a correlation between structure and function of organic matter. Indeed it is declared that from

the anatomy of an organism a biologist can infer the habits, the manner of life, of that organism.

Whether the structure of the brain determines its functions or *vice versa,* brain structure and brain function are correlative; a normal brain functions normally, a deformed brain acts abnormally. We have seen that the law of heredity applies to the form and functions of the body, including of course the structure and functions of the brain. It is also generally accepted that the brain is the organ of the mind. To be sure, the relation of brain activity and mental processes cannot be demonstrated to be that of cause and effect. But that problem need not be considered here. It is sufficient to recognize that brain activity and mental processes invariably accompany one another. An injury to the brain disturbs mentality, a sudden withdrawal of blood from the brain, putting a stop to its activity, brings on unconsciousness (sleep or fainting), an increased supply of blood to that organ, increasing its activity, is accompanied by mental exhiliration; undue congestion of the brain is accompanied by delirium. For the purpose of the study of heredity we need only recognize the correlation of brain activity and

mental processes. Recognizing this correlation, recognizing also the transmissibility of brain structure and functions, we might conclude *a priori* that mental powers and mental peculiarities are also transmissible. To what extent this conclusion is supported by observation will be shown by Ribot's investigations.

INSTINCT.

Beginning with instinct, using that word in its scientific sense as applying to "acts conformed to an end, but without consciousness of that end," Ribot finds that it is unquestionably transmissible. "The animal inherits the psychical dispositions, no less than the physiological constitution of its parents." "The tenacity of instincts is so great, and their hereditary transmission so certain, that sometimes they outlive for centuries the conditions of life to which they are adapted." He cites Darwin's allusion to the repugnance of the common ass and the camel to cross a stream of water as inherited from their very ancient desert-born ancestors.

Instincts, though not as adaptable to changing environments as intellect, can be gradually modified to some extent and Ribot finds that "acquired in-

stincts, as well as those which are natural, are transmitted by heredity." The transmissibility of acquired instincts makes domestication of wild animals possible. But we must bear in mind that there is a strong tendency to revert to the original type so that it may require the influence of training and changed conditions during several generations to fix the acquired habits.

Instinct has been compared with unconscious activities of the human mind as exemplified in somnambulism—the somnambulist performing only such acts as have become habitual to him.

PERCEPTION.

Next are the perceptive faculties,—touch, sight, hearing, smell and taste, transmissible? While sensorial activities are begun in the special organs of sense, they are perfected, perceived, in consciousness. Of the specific qualities of the senses their transmissibility is certain, "each animal derives a certain kind of senses from its parents." With regard to secondary characters, those peculiar to individuals, Ribot finds that, as a rule, they too are hereditary. Parents transmit to their children the most singular perfections and imperfections of

touch. Persons differ very much in sensitiveness to pain, to cold, to tickling, to contact with or near presence of silk, cork or the downy skin of peaches; these idiosyncrasies, as also left-handedness, are transmissible.

As to SIGHT, "The peculiarities of vision which depend on mechanical causes are strabismus, myopia and presbyopia. The transmission of these is very common." "Anaesthesia of the nerves of sight is transmissible in all its grades and in all its forms"—from moderate cases to blindness. Color-blindness is transmissible as is also keen-sightedness—seeing at great distances. "These are some persons who seem gifted with extraordinary—almost supernatural—powers of sight. Some cases of this kind are so well attested as scarcely to admit of doubt. Thus, sight at great distances and through opaque substances appears, in some cases, to be proved beyond the possibility of fraud. If there is any explanation of this and other like phenomena, it can only be on the supposition of hyper-aesthesia of the optic nerve. P. Lucas gives a long account of Hirsch Daenemarck, a Polish Jew, who, about the year 1840, travelled over Europe, showing by decisive experi-

ments that he could read in a closed book any page or line that might be desired. This man's son perceived, at about the same age as his father (ten years), that he possessed this same faculty, and perhaps in a more remarkable degree."

HEARING. The heredity of deafness has been disputed or held to be the exception. Besides noting that there are many well attested cases of transmission of deafness, it must be borne in mind that deaf-muteness of parents may be transformed into some other infirmity in the children, as hardness of hearing, mental obtuseness and idiocy.

Acuteness and dullness of smell and taste, liking and repugnance for certain flavors, are hereditary.

MEMORY.

Memory may be safely considered hereditary, though because of its inconspicuous nature as compared with other activities, there is no abundance of testimony in the matter. Talent for painting (memory of forms and color) and for music (memory of sounds) are often transmitted. But of aphasia, the inability to remember and express words, there are no cases of heredity on record.

IMAGINATION.

Creative imagination is transmissible. "We often find families of poets, musicians and painters." Excellence in music and painting being dependent upon physical and physiological conditions of ear and eye respectively, the inheritance of the latter physical characters makes the inheritance of these arts more certain than that of poetry. Ribot gives a list of fifty-one eminent poets of whom twenty-two have had one or more distinguished relatives. "Of forty-two painters, Italian, Spanish and Flemish, held to be of the highest rank, Galton found twenty-one that had illustrious relatives." Ribot gives a list of twenty great musicians all but four of whom were members of families of remarkable musicians and these four had relatives of some musical capacity.

INTELLECT.

Do the laws of heredity apply to the higher forms of intelligence, intellect proper, the faculty of making abstract and general conceptions, to compare, to judge, to reason, making possible science, art morals, social and political life—making "of man, as it were, a being apart from all the rest of

nature?" We must refer the interested reader to Ribot's work for the reasoning and for the detail of facts that he has brought together. Since nearly all the arts and sciences involve a use of the higher faculties, Ribot restricts his investigation of the heredity of intellect to "cases in which pure intellect —that is to say, reflection, taste or criticism—predominates." He gives a long list of eminent men of science and men of letters, ancient and modern, with their relatives who were famous for achievements in intellectual pursuits.

THE SENTIMENTS AND PASSIONS.

Heredity of physical and moral tendencies. We come in contact with the outer world through our senses. The sensations of light, of sound, of resistance, caused by this contact, besides giving us knowledge of things, cause agreeable or disagreeable FEELINGS. Other agreeable or disagreeable sensations come to us through IMAGINING possible external conditions—possible good fortune or calamity; then again the state of the organs of the body, their vital processes, give rise to complex sensations; and finally RECOLLECTIONS of former states or experiences give rise to agreeable or disa-

greeable sensations. These various "modes of sensibility are so intimately connected with the organs, and with the whole constitution, that, *a priori*, we might conclude that they are transmitted by heredity. Experience will be found to verify this hypothesis." Organic sensations, so intimately connected with all the functions of the body are undoubtedly transmitted. They are probably the true source of all resemblances of character, of strange propensities, instincts and dislikes.

Of the three chief physical wants, thirst, hunger and the sexual appetite, it is easier to prove their transmissibility. THIRST.—Dipsomania or alcoholism is hereditary, but sometimes transformed in transmission into mania or idiocy, as conversly these may result in alcoholism in the descendants.—"This continual metamorphosis plainly shows how near passion comes to insanity, how closely the successive generations are connected, and, consequently, what a weight of responsibility rests on each individual. 'A frequent effect of alcoholism,' says Dr. Magnus Huss, 'is partial or total atrophy of the brain: the organ is reduced in volume, so that it no longer fills the bony case. The consequence is

a mental degeneration, which in the progeny results in lunatics and idiots.' " Ribot quotes a number of illustrating examples of which the following is one. "Dr. Morel gives the history of a family living in the Vosges, in which the great-grandfather was a drunkard, and died from the effects of intoxication; and the grandfather, subject to the same passion, died a maniac. He had a son far more sober than himself, but subject to hypochondria and homicidal tendencies; the son of this latter was stupid, idiotic. Here we see in the first generation, alcoholic excess; in the second, hereditary dipsomania; in the third, hypochondria; and in the fourth, idiocy and probable extinction of the race."

GLUTTONY is transmissible. "Saint-Simon informs us that Louis XIV. was a man of extraordinary greediness, and the same was the case with his brothers. Nearly all this king's sons were gourmands and great eaters, and this passion has been transmitted to their descendants." Ribot also gives instances to show that morbid tastes, as cannibalism and clay-eating are hereditary.

"There is scarce reason to insist on the heredity of all that is connected with the sexual appetite."

"'I knew,' says Prosper Lucas, 'a very handsome man, of an excellent constitution, but possessed of an unbridled passion for wine and women. He had a son, who, while yet but a lad, carried both these vices to excess. He carried off a mistress from his father, who never forgave the offense to the day of his death. This was the outset of his career; he was afterwards ruined, and reduced to the utmost penury by harlots. *His* son died young, but incorrigible, and from the same vices as his father and grandfather.'"

Passions not so obviously connected with the organism—GAMBLING, AVARICE, THEFT and MURDER, are also hereditary. Da Gama Machado is quoted who tells of a mother, son and grand-mother, all having a passion for gambling.

On the inherited effects of AVARICE, Maudsley is quoted thus: "In several instances in which the father has toiled upwards from poverty to vast wealth, with the aim and hope of founding a family, I have witnessed the results in a physical and mental degeneracy which has sometimes gone as far as the extinction of the family in the third or fourth generation. When the evil is not so extreme as mad-

ness or ruinous vice, the savor of a mother's influence having been present, it may still be manifest in an instinctive cunning and duplicity, and an extreme selfishness of nature—a nature not having the capacity of a true moral conception or altruistic feeling. Whatever opinion other experimental observers may hold, I cannot but think that the extreme passion for getting rich, absorbing the whole energies of a life, does predispose to mental degeneration in the offspring—either to moral defect, or to intellectual and moral deficiency, or to outbreaks of positive insanity, under the conditions of life."

The heredity of disposition to theft and to murder are also shown by conclusive examples, records showing that the tendencies had run through several generations.

WILL.

Will is referred to the active faculties as contrasted with the merely contemplative—where action and command is the predominant trait to which all the other powers of body and mind are auxiliary, as exemplified in soldiers and statesmen. "Like every other faculty, strength of will may be hereditary." In support of this conclusion a long list of

historical luminaries is given showing that members of families during several generations were famous for executive powers that often controlled the destinies of nations.

ABNORMAL MENTAL STATES.

Having found the normal intellectual powers hereditary it remains to inquire whether abnormal mental states are also transmissible. As previously noted, brain structure and mental activity are correlative. As normal mentality accompanies normal brain structure so deranged mentality goes with an abnormal brain. (Though there have been cases of abnormal minds where abnormal structure of the brain could hardly be demonstrated.) As structure and physiology of the brain, like that of all other organs of the body are transmissible we may conclude that the heredity of abnormal mentality goes with heredity of the mental organ. This is proven to be the case by observation. Here especially, however, we must note the frequency of transformation of nervous disorders in transmission. "Nothing is more frequent than to see simple insanity become suicidal mania, or suicidal mania become simple insanity, alcoholism or hypo-

chondria." Ribot gives interesting and convincing examples of the heredity of the chief varieties of morbid mental states under the heads of hallucination, monomania, suicide, mania, dementia and idiocy.

Chapter 3.

A BIOLOGICAL VIEW.

Having seen what nature does in the matter of endowing offspring with the characters of their ancestors, we must now investigate how it is done, not hoping to discover all her secrets nor even endeavoring to follow all the intricate minutiae of modern scientific research, much of which is still involved in uncertainty and contradiction. We shall endeavor, however, to lay bare enough of nature's mechanism to give us some notion of the biological processes that underlie the hereditary phenomena noted by Ribot and other careful observers.

CELLS.

Cells are specs of living matter varying in size from midgets that are barely visible under the most powerful microscopes to the giants of the race that, big as pin points, can be seen with the naked eye. A cell consists of slimy, semi-transparent, organic (living) matter (called protoplasm), generally having near its center a spot of rather opaque substance called its NUCLEUS. This nucleus contains a

peculiar substance, usually arranged in spiral form, called the nuclear thread. The nucleus is the seat of government of this little spec of living substance. By means of its slimy body the cell engulfs and digests small particles of food. Thus it is capable of nutrition and so of growth. All parts of the cell grow simultaneously—the slimy body and the nucleus with its nuclear thread. When the cell has grown to its limit in size, the nucleus divides into two parts each containing one-half of the nuclear thread. The cell now has two nuclei which draw apart. Then the slimy body of the cell is divided into two equal parts at a line between the nuclei—leaving each nucleus with its thread and surrounding slimy body. Each division is just like the original cell, so that there are now two cells (called daughter-cells) in place of the original cell (called mother-cell). The daughter-cells now feed, grow, double by division, thus forming four cells. These again in like manner multiply or *reproduce*. This is the usual manner of cell reproduction.

Occasionally a union of cells takes place. Two cells approach one another, their slimy bodies fuse and become one, the nuclei draw together and unite

—the two cells have become a single cell which then proceeds to grow and divide and subdivide in the usual cell fashion.

In some cases the cells resulting from division do not draw apart but remain in contact with one another with just a thread of matter connecting each with its neighbor, thus forming a colony of cells, each cell performing for itself, however, the functions of digestion, nutrition and reproduction. Here we have the first step in the evolution of many-celled higher organisms. There is union of cells into one body but as yet no division of labor, no centralization of government.

It requires volumes to even indicate the stages of development or evolution of organisms from the simple cell to the many-celled higher plants and animals. It must here suffice to remind the reader that all plants and animals, including man of course, are composed entirely of cells. But while in the first colony of cells just described the cells are all alike, each performing alike all the offices of the whole, in the higher organisms the cells have become differentiated, there is division of labor. Some cells are concerned only with digestion, others with contrac-

tion or movement (forming the muscles), still others with communication, making connection between different parts of the body and with the outer world (nerves), and so with all the offices or functions to be performed by the body. Particular kinds of cells are best fitted for and attend to particular functions.

We have said that the nucleus is the seat of government of the cell—directs the cell's activities. Then, as the cells of a body vary in their activities, some performing one office, some another, we must look for a corresponding difference in the nuclei of those cells, that is, there must be a correspondence between the nature of the cell's activity and the nature of its nucleus. Either the nuclei of the various kinds of cells composing the body differ from one another altogether (in structure or chemical composition) or, if they are all alike in this respect, then some particular part of the nucleus must be active (governing) in one kind of cell (the remainder being dormant), and other parts active in other kinds of cells—the nature of the activity or function of the cell corresponding with the part of the nucleus that is active.

REPRODUCTIVE CELLS.

Among the many kinds of cells in the human body (as in animals and plants), there is one kind whose office is reproduction, not only reproduction of the cell itself, which is common to all cells, but reproduction of the species. In some of the lower forms of life an offspring is developed from one reproductive cell derived from its one parent. In other forms of life any two reproductive cells from the same parent must unite to form a single cell from which the offspring then develops. All the higher forms of plant and animal life not only require the union of two cells but these two cells must come from two individuals of the opposite sex (or at least, as in most plants, from different sex organs of an individual). The reproductive cell from the male is called the sperm-cell (seed-cell), that from the female, egg-cell. The testes of the male are the nursery of the sperm-cells, the ovaries of the female, of the ovum or egg-cell.

DIVISION OF NUCLEAR THREAD.

We must now give closer attention to the structure of reproductive cells and especially to the behavior, or manner of division, of their nuclear

threads during the process of multiplication of these cells, as revealed by the microscope. The reproductive cell, then, as found in the testis or in the ovary, is a semi-transparent spec of protoplasm enclosing a somewhat opaque, rounded body, the nucleus. The nucleus, surrounded by a very delicate, transparent wall, consists of two parts, the semi-fluid nuclear sap and the network of NUCLEAR THREAD (or chromatin—the "germ-plasm" of Weismann). It is important here to note that THE NUCLEAR THREAD OF THE REPRODUCTIVE CELLS IS THE MATERIAL BY VIRTUE OF WHOSE PROPERTIES THE OFFSPRING INHERITS THE FORM AND NATURE OF ITS ANCESTORS, not only the form of body and characters that distinguish species, so that dog always produces dog and man always man, but personal characters and peculiarities as well.

The nuclear thread grows with the other parts of the cell and when the cell divides to form two daughter-cells, the nuclear thread begins the process by dividing into two parts, each drawing around itself one-half of the cell protoplasm. This division of the nuclear thread takes place in a most methodical manner that demands the close attention of the

student of heredity. As a preliminary step the thread separates into a definite number of distinct filaments (shaped like loops or rods), called CHROMOSOMES. The number of chomosomes varies (from two to twenty-four) in different species, but in the same species the number is always the same. All the chomosomes then split lengthwise, so that each rod or loop becomes double and the number of chromosomes is now twice the normal number. The chromosomes now draw apart in such a manner that the two parts of each original (parent) rod or loop move to opposite sides of the cell so that after the cell divides at a line between the two groups to form two daughter-cells, each daughter cell contains one of the divisions of each of the parent chromosomes. The resulting groups of daughter-chromosomes constitute the nuclear thread of their respective daughter-cells.

In order to account for some of the phenomena of heredity it is necessary to assume that, when a chromosome divides, the resulting two divisions or daughter-chromosomes are exact reproductions of the mother chromosome and consequently exactly like it in latent hereditary potentialties. It follows

that when a reproductive cell divides, as explained above, the nuclear threads (the hereditary material) of the two daughter-cells are exactly alike—each a faithful copy of the nuclear thread of the mother-cell. Biological investigators are practically agreed that this faithful copy and equal division of the nuclear thread of multiplying cells applies to all *reproductive* cells—cells concerned with the reproduction of the species.

Whether it also holds good in the case of the other cells of the body (body or somatic cells), those concerned with functions other than reproduction, as muscle, nerve, liver cells, etc., is still a matter of disagreement between the foremost investigators. Some contend that during embryonic and post-natal development only those nuclear threads that are destined to govern *reproductive cells* remain unchanged in the course of repeated divisions, each a perfect and complete copy of its predecessors; so that the nuclear thread of the reproductive cell which finally is actually employed in the production of offspring is essentially equivalent to the nuclear thread of the cell (the Germ-cell) from which the parent developed. Those cells, however,

whose multiplication is the means of constructing other organs of the body, muscles, bones, nerves, digestive organs, etc., are by them supposed to receive only such parts of the nuclear thread as are fitted to govern or direct the particular respective activities of those organs—the reproductive cells alone requiring all parts of the nuclear thread of the species in order to be able to reproduce the entire body. This is in keeping with the theory so ably upheld by Weismann. Other competent investigators, however, have demonstrated to their own satisfaction, that there is no such diversified manner of division of nuclear matter, but that all cell multiplication is based upon equal division (doubling division) of the nuclear thread, that consequently the structure and composition, the nature and governing power of the nuclear threads of all cells—body and reproductive—of an individual are alike and equivalent; that the various forms and functions of the cells of a body result, not from the varying nature of their nuclear threads, but are determined by the place in which the cells come to be located, by the influence exerted on them by the position and activity of their neighboring cells—each cell performing

such function and assuming such form as its environment impresses upon it. It is not essential to the solution of the problems of heredity that it be determined which of these rival theories is correct. It is important, however, to note the point upon which all are practically agreed, namely that the material basis of heredity, the nuclear thread of the reproductice cells of an individual, is the result of oft repeated but always equal division of the nuclear thread of the original cell (the Germ-cell) from which that individual was developed.

SPERM-CELL AND EGG-CELL.

As previously stated, it is the union of a sperm-cell with an egg-cell that gives rise to a single cell, the GERM-CELL, whose development by growth and repeated division within the mother's womb finally produces the new being or offspring. These, the human sperm-cell and egg-cell, we must now examine and investigate the manner of their union in order to understand the nature and importance of the hereditary relation between parents and offspring.

Among the reproductive cells of the ovaries and of the testes, called the "primative sex-cells,"

certain ones grow more rapidly than their neighbors and develop into EGG-MOTHER-CELLS and SPERM-MOTHER-CELLS respectively. It was stated before that the nuclear thread of cells consisted of a number of chromosomes and that their number never varied in he cells of the same species. So the primative sex-cells have the normal number of chromosomes; but in their development into egg-mother-cells and sperm-mother-cells the number of chromosomes becomes *doubled*. When the sperm-mother-cell within the testis finally divides, the individual chromosomes do not split up into two parts, as usual, but one-half of their number go to each daughter-cell. These daughter-cells immediately divide in the same manner, half the number of chromosomes going with each division. So that the sperm-mother-cell (containing double the normal number of chromosomes), has given rise to four cells, each containing ONE-HALF THE NORMAL NUMBER OF CHROMOSOMES, and an equal division of the protoplasm or nutritive body of the sperm-mother-cell. These four cells are immature sperms. The protoplasm usually lengthens out into a slender vibratile tail while the nucleus forms the head of the

sperm or SPERMATOZOON as it is now called. The spermatozoon, then, it is important to remember, contains HALF the normal number of chromosomes and a small supply of nutritive material.

Within the ovaries, the egg-mother-cells (containing twice the normal number of chromosomes), by actively absorbing nutriment, grow to a great size. Each egg-mother-cell thus becomes an OVUM (egg) which becomes enclosed within a protective vesicle called the Graafian follicle. The Graafian follicles, each with its enclosed ovum, gradually move toward the surface of the ovary where (at intervals of about four weeks) they burst one by one, setting free the enclosed ovum, which is deposited on the surface of the ovary. Here then is the egg-cell or ovum, having TWICE the normal number of chromosomes (the hereditary material) and a large store of nutritive material, all enclosed within a thin transparent cell-wall which has a small aperture (micropyle) at one point of its surface.

CONCEPTION.

From the surface of the ovary the ovum is caught up by the fimbriated ends of the Fallopian

tube and conducted through this tube (which is barely large enough to admit a bristle) to the womb. Just where conception usually takes place, that is, where the ovum and spermatozoon meet and unite, whether during the passage of the ovum through the Fallopian tube or within the womb, has not been positively determined. It may take place in either location or even on the surface of the ovary, but probably the Fallopian tubes are the usual place of their union. During sexual union the spermatozoa are deposited within or near the mouth of the womb. They are capable of locomotion and move up through the womb and the Fallopian tubes in quest, as it were, of the ovum. Of the great number of spermatozoa supplied only one is necessary to fecundate the ovum and only one normally succeeds in uniting with it.

Before the ovum can receive the spermatozoon the former must undergo an interesting (and, to the student of heredity, an important) process called the MATURATION OF THE OVUM. Its nucleus (which, it will be remembered, has twice the normal number of chromosomes) moves toward the surface of the ovum where one-half of its chromosomes

with a very small portion of protoplasm are extruded, forming a bud or minute cell, called a "polar cell," on the surface of the ovum. After a brief interval the process is repeated, the nucleus of the ovum parting with half of its remaining chromosomes in forming a second polar-cell. This completes the process of maturation. The ovum, possessing one-fourth its original number, or ONE-HALF THE NORMAL NUMBER OF CHROMOSOMES, is now on an equal footing with the spermatozoon which, we remember, also has one-half the normal number of chromosomes that correspond also in size and shape to those of the ovum.

The spermatozoon that succeeds in finding the micropyle (the entrance) to the ovum force its head (which consists essentially of the nucleus with its chromosomes) through the aperture, leaving the tail at the surface. The nucleus of the spermatozoon draws toward the nucleus of the ovum. They unite and merge into one. This cell with the single composite nucleus is now called the GERM-CELL. The Germ-cell, it must be observed, is possessed of the NORMAL NUMBER of chromosomes, half of them contributed by the father, half by the mother. This

Germ-cell (sometimes called the embryo-cell) is the single-celled embryo; its composite nucleus directs its growth and multiplication by repeated cell division within the womb of the mother, eventually developing into the child at full term when it is born to independent existence.

The Germ-cell, the beginning of the new being, then, is made up of living substance taken from the bodies of both parents; that is, the Germ-cell, the offspring, is literally A LIVING PART OF THE BODIES OF THE PARENTS, that by development before and after birth grows into a being like themselves. Thus there is a material connection between parents and offspring, or rather, there is a material continuation from parents to offspring, a line of living substance leading from ancestors through numberless descendants, "a life that, barring accidents, need never end."

Spencer remarks that this aspect of earthly immortality may seem of little practical importance to the individual, as an individual, it being a matter of little concern to him whether he owes the origin of his existence to the union of two living particles derived from the bodies of his parents, or whether

his life began *de novo,* spontaneously as it were, merely being nourished and protected by his mother till able to exist independently. So long as his existence as an individual must come to an end what matters it to him whether he is connected with those who preceded and those who may follow him by a continuous thread of living substance or wholly separated from them? The importance of this material connection between parents and offspring lies in the consideration that BY VIRTUE OF IT THE REPRODUCTION OF THE PHYSICAL, MENTAL AND MORAL CHARACTERS OF THE PARENTS IN THE OFFSPRING IS MADE POSSIBLE. For the material bearers of hereditary characters (the chromosomes) of the conjugating ovum and spermatozoon, representing the maternal and paternal characters respectively, together constituted the hereditary material (the chromosomes) of the Germ-cell. Here, in the chromosomes of the Germ-cell, are present, potentially, all the bodily, mental and moral characters, both specific and personal, with which to equip the new human being—some of the characters to become active and so observable during the offspring's life (and recognizable perhaps as features or disposi-

tions like those of either parent), others to continue undeveloped, or latent, but all of them capable of being transmitted as a potentiality to the offspring's own future offspring and so on through generations beyond compute.

IMPORTANT POINTS TO REMEMBER.

1. The nuclear thread governs the activities of a cell.

2. The uniting or merging of the nucleus of the spermatozoon with the nucleus of the ovum to form the nucleus of the Germ-cell is the biological object of sexual commerce. It is the initial and essential step in reproduction.

3. The Germ-cell is the beginning, the first stage of individual life.

4. The nuclear thread (chromosomes) of the Germ-cell is the directive influence in the development of the individual. Itself growing and multiplying by division with the growth and multiplication of the cells, which finally produces the body, the nuclear thread of the Germ-cell is eventually distributed to all the cells of the body.

5. The form of all the organs of the body and

the manner of their activity are influenced by the nature of the nuclear thread of the Germ-cell.

6. The nuclear thread of the reproductive cells of an individual are the direct descendants (by repeated equal division), of the nuclear thread of the original Germ-cell from which the individual was developed.

7. The nuclear thread (the material basis of heredity) of the Germ-cell is furnished by the bodies of the parents—the mother supplying half with the maturated ovum, the father the other half with the conjugating spermatozoon; hence the offspring developing from the Germ-cell is in structure and activities a composite of its parents.

PART II.

PRENATAL INFLUENCE.

Chapter I. A GENERAL VIEW.

LIMITATION OF PARENTAL POWER.

We have seen, then, that the overwhelming testimony of observed phenomena and of scientific explanation, logically interpreted, justifies the conclusion that there is a very powerful tendency to reproduce in the child the bodily and mental characters of its ancestors. To express it in another way—physical and mental characters have a tendency to persist during successive generations, active during some generations, latent during others, but always present. This accounts not only for the child's resemblance to its parents, but also for the child's possession of characters not observed in its parents but known to have been possessed by some more remote ancestor. This shows the seriousness of the scientific pleasantry that one cannot be too particular in the choice of ones ancestors.

While all of the specific and most of the personal characters of an offspring can thus be accounted for, there are occasionally phenomena that seem to contradict the usually accepted laws of heredity and that must therefore find some other explanation. When a person is endowed with characters not possessed by his ancestors or has some ancestral character in an incomparably more intensified form, we must conclude that THE TENDENCY FOR LIKE TO BEGET LIKE IS SUBJECT TO MODIFYING INFLUENCES. This would suggest, as complementary to Holmes' famous jest, the question whether one could not be more particular in the choice of ones descendants. While the final answer cannot be given (we are reminded that no biological problem is ever solved finally), while there is still doubt and contradiction, the conviction is now almost universal that both physical and mental characters of an offspring as constituted at birth are partly the results of influences, external to itself, EXERTED UPON ITS DEVELOPMENT BEFORE BIRTH, and that these influences are largely within the control of its parents.

Since it is easy to believe what one would like

to believe, there is a temptation to go to extremes, to make extravagant assertions concerning the power of parents over the prenatal development of their offspring—attributing to them power that would appear to annul all hereditary tendencies—to produce saints from criminals, genius from any clod. Such thoughtless extravagance can but lead to mistrust or to disappointment. We must bear in mind the important fact that parental effort can but influence, develop, modify; it cannot create. Parents can work upon only such hereditary material as is in their keeping and with such ability as they possess. The new-born child is the result of countless activities that have taken place during thousands of generations of its ancestors; its parents could add their influence only in the final modifying touches. The possible extent of these final modifications cannot of course be accurately determined, but are sufficiently important to inspire all prospective parents to a careful study of the laws of pre-natal influence so far as they are known or reasonably conjectured.

AUTHORITIES.

An undertaking is the more carefully and diligently pursued the more one is convinced of the efficiency of one's efforts, of the certainty of their results. So, for the benefit of those not familiar with modern scientific thought on the important question of pre-natal influence, the conclusions of some of the ablest investigators of biological and physiological problems are subjoined. The term "pre-natal influence" in its broadest biological application would include all the experiences of all the offspring's ancestors back to the dawn of life, but the term is generally employed, and is here used, to include influences during the period beginning a few months before conception and ending at birth—influences, then, that affect the developing reproductive cells of both parents as well as those that act on embryonic and fetal development of the Germ-cell.

Dr. Fordyce Barker: "Maternal impressions may affect the development, form and character of the foetus."

H. Courtenay Atwood, M. D., in Quarterly Journal of Psychological Medicine, after speaking

of the reciprocal influence of emotions and bodily functions, says, "With these facts in view, it would be fair to conclude *a priori* that the mental condition of the pregnant female must exert some influence upon the various processes of development of the foetus *in utero;* and this can be shown from experience to be really the case. It is therefore evident that we have the power to affect, to the advantage or disadvantage of the future child, the circumstances under which it is being formed, through the medium of the maternal mind; and the judicious exercise of this power is what is meant by the term 'education anterior to birth.' "

The fetal bloodvessels of the placenta, as PROFESSOR DALTON has shown (A. Treatise on Human Physiology), "are bathed everywhere in the placental sinuses with the blood of the mother; and the processes of endosmosis and exosmosis, of exhalation and absorption, go on between the two with the greatest possible activity"—"there is now little room for doubt that various deformities and deficiencies of the foetus, conformably to popular belief, do really originate in certain cases from nervous impressions, such as disgust, fear or anger, experienced by the mother."

Dr. A. Combe (On Management of Infancy): "If a sudden and powerful emotion of her own mind exerts such an influence upon her stomach as to excite vomiting, and upon her heart as almost to arrest its motion and induce fainting, can we believe that it will have no effect upon her womb and the fragile being contained within it? Facts and reason then alike demonstrate the reality of the influence, and much practical advantage would result to both parent and child were the conditions and extent of its operations better understood."

"Aedoeology," p. 49, "We have seen cases where the child has been affected physically as well as mentally even within a short time before birth."

Wm. A. Hammond, M. D., in Quar. Jour. of Psychological Medicine Vol. II., quotes Malebranche (Recherche de la Verite). "An infant in the womb is connected with her in the most intimate manner which it is possible to imagine. * * * * It is reasonable, therefore, for us to believe that the feelings, the passions, in a word, all the thoughts which she experiences from sensations in her body are likewise felt by the foetus. For if one reflects that a mother being frightened by a cat will be

horrified every time that it sees this animal, it is easy to conclude that the child saw, with horror and emotion before its birth, the image which had terrified the mother."

GAHARLIEP is quoted as declaring that his own son was born with his right hand distorted and dislocated, in consequence of his mother having seen from her carriage, eight days before her delivery, a man with his hands in these conditions.

W. B. CARPENTER. "That the mental state of the mother can produce important alterations in her own blood seems demonstrated by the considerations previously advanced in regard to its effect upon the processes of nutrition and secretion, and that such alterations are sufficient to determine important modifications in the development processes of the embryo, to which her blood furnishes the material, can scarcely admit of question, when we recollect what an influence the presence or absence of particular substances has in modifying the growth of parts in the adult."

DR. S. B. BRITTAN ("Man and His Relations"). "That the predominant feelings and general tendency of mind existing in the parents at the

time of conception and—so far as the mother is concerned—during the successive stages of gestation, may determine the mental characteristics and prevailing disposition of the child, is confirmed by facts which are quite too palpable to be overlooked or denied and of too significant and momentous a character to be lightly regarded. The demands of this essential law of our being will never be duly respected so long as the generation of human beings is left to accident, sudden caprice, or unconquerable passion. Millions of unwelcome children are forced into the world and left unarmed to grapple with a cruel destiny. The advent of each is viewed as a misfortune, or perhaps, regarded as a Providential affliction. Children generated and born under unsuitable conditions are liable to carry with them lifelong consequence of the thoughtlessness or depravity of their progenitors; especially when the unhappy state of feeling in the mother, during the whole period of gestation, has contributed to fix and deepen the impression."

"If in the mother there exists any unusual tendency of the vital forces to the brain at the critical period, there will be a similar cerebral development and activity in the offspring. A lady who, during

the period of gestation, was chiefly employed in reading the poets and in giving form to her day-dreams of the ideal world, at the same time gave to her child (in phrenological parlance), large Ideality and a highly imaginative turn of mind."

"Any object of intense desire or that occasions sudden surprise or extreme fear, is liable to be impressed on the foetus. These effects are most frequent among women whose minds and nervous system are most active and impressible."

CASES AND CONCLUSIONS.

Mozart's father was a good musician. His brother, Wolfgang had no disposition for music. Mazart's mother cultivated music during the early years of her married life, but afterwards abandoned it, even taking a dislike to it after her first two accouchements. Wolfgang was born under the latter influence.

F. R. BRUNNER, M. D., in "Medical and Surgical Reports," Vol. 45, gives the following cases:

"Mrs. H's second child was born with red hair and fair skin, afterwards covered with freckles. Both parents had dark complexion and black hair—no red hair among their relatives. During her sec-

ond pregnancy on a certain Sunday, she stood behind her future brother-in-law, who had a head full of fine, fiery red hair, and admired its beauty. Another child born one and a half years later, by same parents, also had fiery red hair. The first child and three others born subsequently at intervals of two years all had black hair and dark complexions. In other features the children all resemble each other except the hair, complexion and freckles."

"Attended Mrs. H. in her first labor. Child delivered had only one eye. Eyelids with lashes on right side were formed, but smaller than those on left side and no eyeball. The mother could think of no cause. Next day she remembered that after the third month of pregnancy she had an intolerable itching of her right eye. She often rubbed the eye with the knuckle of her index finger. The child's eye had the appearance of suspended development, occurring about the fourth month of foetal existence."

Dr. C. T. Williamson, in London Lancet: "Mrs. D., when four months pregnant, opened the door of a shed when a black and white collie dog pushed against her and ran away. It made a deep

impression on her and continually till the day of her confinement she told her husband that her child would be disfigured. When born the child had the right thigh covered by a mole from groin to knee, studded with long white hair."

Dr. Robert J. Colenso, in "London Lancet," 1897: "A baby's little finger was accidentally cut off at the bone with a hatchet by its brother. The mother was then a few weeks pregnant and made up her mind that the future infant 'would have something the matter with its hands.' Her first question on delivery showed that she had kept the matter in her mind. The child had a supernumerary ulnar digit on each hand. There was no family history of such additional fingers. The same woman on a previous occasion had been confident of a 'bunch of grapes' which duly appeared as a naevus on the breast.'

Dr. Wm. A. Hammond. "The following case which occurred in my own experience can scarcely admit of a doubt as to the influence of the maternal mind over the physical structure of the foetus. A lady in the third month of her pregnancy was very much horrified by her husband being brought home

one evening with a severe wound of the face from which the blood was streaming. The shock to her was so great that she fainted and subsequently had an hysterical attack during which she was under my care. Soon after her recovery she told me that she was afraid her child would be affected in some way, and that even then she could not get rid of the impression the sight of her husband's bloody face had made upon her. In due time the child, a girl, was born. She had a dark red mark upon the face, corresponding in situation and extent with that which had been upon her father's face. She proved also to be idiotic."

Dr. Ruegger (Brit. and For. Med. Review), reports that a woman, who had already born four healthy children, was in the seventh month of her pregnancy bitten in the right calf by a dog. The author saw the wounds made by the animal's teeth, which wounds consisted of three triangular depressions, by two of which the skin was merely slightly ruffled; a slight appearance of blood was visible in the third. The woman was at the moment of the accident somewhat alarmed; but neither then nor afterward had any fear that her foetus would be

affected by the occurrence. Ten weeks after she was bitten the woman bore a healthy child, which however, to the surprise of every person, had three marks corresponding in size and appearance to those caused by the dog's teeth in the mother's leg, and consisting like them of one large and two smaller impressions. The two latter, which were pale, disappeared in five weeks; the larger one also is not now so large or deep-colored as it was at birth. At the time of writing the child was four months old.

London Lancet, 1897: The daughter of a medical practitioner was alone in the house preparing her expected baby's wardrobe (expected six months hence). Her uncle called with the present of a hare, and after knocking, ringing and failing to attract attention, walked in, opened the door where she was sitting, threw in the hare "but spoke not a word." From that moment of fright she "vowed and declared" her belief that some untoward event would happen to her baby, and sure enough, the unfortunate baby (a girl) was born with the so-called hare-lip.

Dr. Chas. W. Chapman, in "London Lancet," 1890: "If it is true that maternal impressions

do influence the development of the foetus in utero, then such sickening specimens of maimed or deformed humanity as are frequently seen in our streets should not be allowed to make the most of their deformities for the purpose of begging. Neither should such persons be used for the purpose of exhibition at places of entertainment. The following is a case in point: A lady in comfortable circumstances, aged twenty-four years, no marked emotional temperament, exceptionally robust, and her two-years-old girl in every respect healthy. The patient informed me that early in her pregnancy she had seen a man begging whose arms and legs were 'all doubled up.' The sight gave her a shock at the time but she hoped that no untoward effect would follow. Her hopeful view was endorsed and she was urged not to trouble herself any further. The child proved an anencephalous monster, the extremities were rigidly flexed, feet almost sole to sole and fingers firmly clenched. It had been dead but a few hours. The lady again became pregnant and unfortunately frequently passed a man who was a partial cripple. This circumstance revived the patient's fears, but she did not appear to be much

depressed and quite hopeful regarding her coming infant. The child was a counterpart of the last one, with the exception of the head, which was normal. Her next child was strong and undeformed."

"The Medical News" (Phila.), 1891: The "Elephant Man." "While visiting a menagerie his mother was greatly terrified by an elephant, which seemed about to attack her; at birth the infant's face resembled that of an elephant, and his skin presented some of the characters of the animal's hide. So shocking is his appearance that he is debarred from any occupation, and subsists upon the charity of the various hospitals.

"Monstrosities most often result from a visual reflex, the terrifying object or occurrence having been seen; they may also develop when emotions of fear or grief have been excited by the description of a horrible object or the narration of a fearful occurrence. Thus, in the observation of the writer, a mother who was shocked by hearing that a friend had been thrown from his horse against a dray and had his skull fractured, gave birth to a child that presented red sensitive areas upon the scalp, corresponding in location with the fracture of the skull

in the person whose death had so alarmed the mother."

In the BRITISH MEDICAL JOURNAL of September, 1891, there is an account of a case in which a pregnant woman, having been shocked by seeing four children, all of one parent, affected with talipes varus, gave birth later to twins each of which presented double talipes varus.

THE MEDICAL MIRROR, 1891, reports a strange case of entire absence of the calvarium in a child, the mother of which had a conviction that the child would be thus deformed, because while pregnant she had been deeply impressed by a picture in a phrenological book showing the brain with the skull removed.

"There are women who would look on without emotion while others would be shocked and terrified. There is no doubt that there is sufficient warrant for the belief in the power of hideous sights, through maternal impressions, to affect the foetus, and that the outrageous placards of the dime museum freaks and monsters should be regulated or forbidden."

DR. S. B. BRITTAN: "A miserable man who

often shocked the delicate sensibilities of his wife by staggering into her presence in a state of intoxication has not only transmitted his insatiable thirst to his unfortunate son, but even reproduced (either directly or through the action of the mother's mind) his own irregular locomotion so that the youth could never walk straight. * * * He is the moving lifelong and appalling record of the great error of his sire."

Dr. Hubert Work, Pueblo, Colo., in the "Medical News" (Phila.), contributes a valuable and most interesting article on the subject of maternal influence. He reports sixteen such cases and records eight more as reported by other physicians. His careful investigation of the subject leads him to the following conclusions:

1. That both physical and mental defects follow maternal mental impressions with such frequency as to establish the relationship of cause and effect.

2. That these conditions are the result of changes in the blood, chemic, circulatory, or both, seems probable.

3. That the probability of defects in the fetus

from mental causes is dependent upon the "mental habit or mental characteristic" or susceptibility of the mother.

4. That maternal anticipation of defect in the child has in itself no influence in the absence of a strong impression.

5. That the impression need not be lasting to cause defect.

6. That personal maternal injury is no more likely to mark the child than the sight of it in another.

7. That the defect is not necessarily similar in location or appearance to the object creating the impression but is likely to be. The apparent constancy of likeness is due to the reporting of such cases only."

A careful study of the preceding opinions and cases does not warrant the conclusion that every mental shock or unusual experience of the pregnant woman invariably affects the child in utero nor even that it generally does so. We must bear in mind that only such cases attract attention where striking results follow unusual prenatal experience. Cases in which maternal experiences do not cause per-

ceptible consequences in the offspring are not reported. We can merely conclude that such shock or experience *is liable* to influence the developing offspring. Nor is the magnitude of the exciting cause the measure of the effect on the child. Subjecting a score of women at the same stage of pregnancy simultaneously to the identical exciting influence might result in twenty different ways,—varying from no perceptible effect to destruction of the being in utero. It is a question not so much of the nature and degree of the exciting occurrence but rather of HOW IT AFFECTS THE MOTHER. This will depend on her former experience, the state of her nerves and her power of self-control, and these latter vary not only in different individuals but in the same individual at different times.

It is not surprising that among the recorded cases of pre-natal influence those which resulted in physical modifications should predominate, and that in nearly all of these cases deformities should seem to be the rule. It is readily understood that mental modifications (unless so pronounced as idiocy) should escape casual observation, and that of physical modifications abnormalities should be

noted while modifications for the better would not be so likely to attract attention. But the fact that mental heredity is based upon, or is concomitant with, heredity of the physical organ of the mind, would indicate that pre-natal influences that modified the brain would necessarily effect mental modifications also. Again, if untoward prenatal conditions can cause bodily deformities, favorable influences should bring about improving modifications. Cases of such beneficial influences and consequent improvement are not wanting altogether. The ancient Greeks evidently were convinced of the efficiency of such prenatal influence for it was their usage to surround their pregnant women with only the most pleasant environments. The perfection of form attained by their youths may be attributed, in part at least, to this practice. It has been suggested that the beautiful paintings of the Madonna and her child, so plentiful in Italy and so intently gazed upon by the devout and adoring Italian women, may account for the great number of Madonna like faces so frequently found in that country. A case of physical improvement is cited by Dr. Brittan: "Some time since I met with a youth who has finely

molded limbs and a symmetrical form throughout. His mother has a large, lean, attenuated frame, that does not offer so much as a single suggestion of the beautiful. The boy is doubtless indebted for his fine form to the presence of a beautiful French lithcgraph in his mother's sleeping apartment, and which presented for her contemplation the faultless form of a naked child." The previously noted case of a lady who, while pregnant, admired the beauty of a head of red hair and thus endowed her child with such hair and corresponding complexion, is another case in point.

As an illustration of mental modification the reader is referred to the case of Mozart noted on a previous page. Here is another case by Dr. Brittan: "Mr. C—— in western New York was making extensive additions and repairs to his house. The work occupied a long time, the premises being in a state of confusion. Mrs. C. possessing a most active temperament, acute sensibilities, and withal a large sense of order, her discordant surroundings kept up an unpleasant excitement of mind and increased her nervous irritability. Their son conceived and born under this influence of nervous and

mental agitation, now twenty years of age is constitutionally restless, dissatisfied and unhappy in a surprising degree."

The results of our investigations, then, may be summed up in these two propositions:

1. The mental and physical condition of the father and mother affects the reproductive elements that are forming, hence their condition of mind and body shortly previous to and at conception will have an effect corresponding to such condition.

2. The states of the mother's body and mind during the period of gestation influence the development of physical and mental qualities of the offspring.

Chapter 2.

PRINCIPLES OF HEREDITY AND PRENATAL INFLUENCE.

RESTATEMENT OF THE MATERIAL CONDITIONS OF HEREDITY.

It seems desirable here to restate briefly some of the more important conclusions arrived at by biological investigations of hereditary problems.

1. The chromosomes (the constituents of the nuclear thread of reproductive cells) are the material bearers of hereditary characters.

2. Each parent by contributing half the number of chromosomes in the Germ-cell (by means of the conjugating spermatozoon and ovum) supplies half the material basis of hereditary qualities to the development of the offspring.

3. If these respective halves of hereditary reproductive material were equal to each other in efficiency the resulting offspring would inherit equally from father and mother.

4. When one half is more active than the other (as is usually the case) the child inherits a

greater proportion of qualities from the parent who contributes the more active chromosomes.

5. Ancestral qualities may be transmitted to offspring in latent form, to become active in some succeeding generation.

6. Hereditary characters become more stable the oftener they are transmitted; hence the longer a character persists the more difficult it becomes to modify or suppress it by prenatal influence, and the greater its tendency to revert to its former condition after having been so modified or suppressed.

7. More recently acquired characters have less stability, hence are more easily suppressed or modified.

Of mental characters those controlling self-preservation (hunger) and preservation of the species (sexual instinct) are as ancient as animate nature, hence the perfection of their hereditary stability—the certainty of their transmission. As the human race in the course of its evolution gradually acquired higher and higher mental characters the latest acquisitions were always the least stable, hence the greater uncertainty at present of the transmission of the higher faculties—as reason, rever-

ence—and hence also their greater susceptibility to prenatal influences.

MODIFICATION OF CHARACTERS.

The child at birth is endowed with certain characters of mind and body, actual or potential, derived from its parents. These are called *congenital* characters. Characters not present at birth, not derived from its ancestors, but obtained by exercise or experience during the individual's life, are called *acquired* characters.

The reproductive cells of the child at birth contain in a latent state characters of mind and body corresponding to the congenital characters of the child. The bodily and mental congenital characters of the child may be modified, may be developed or suppresed, strengthened or weakened by the experiences (education, use, disease) during childhood, adolescence and maturity. Such modifications of the congenital characters of the individual, impressed upon the proper nerve centers, react upon the hereditary material of the reproduction cells of that individual in such a manner as to cause corresponding modifications of their latent characters. Hence it is that a person endowed with some de-

gree of a particular faculty, as a talent for music, for painting, or speaking, by exercising that faculty, not only strengthens the faculty in himself, but causes a modification of the same latent character of his reproductive cells and thus tends to endow his offspring with that faculty in an intensified degree. In order to avoid misapprehension it may be well enough to note that it is not the art that is inherited, but the talent, the fitness—not the execution but the modification of organs which constitutes aptitude. It must also be borne in mind that the offspring inherits from both parents and that a talent possessed by only one parent may give way, in the offspring, to some other character derived from the other parent. Even then the talent may be inherited in a latent form to appear as an actuality in a subsequent generation.

Congenital characters, then, and their modifications are transmissible. What about the inheritance of acquired characters? In the first place what seems an acquired character may in reality be the development of a latent congenial character. In one sense, all acquired characters are but modifications of congenital characters. However, the ability of an

individual to become modified to the extent of acquiring a new character would seem to imply the ability of that individual's reproductive cells to be modified in a corresponding manner—and the testimony from animal as well as human experience tends to show that characters acquired during an individual's life are transmissible.

HERBERT SPENCER: "functionally produced modifications of structure are transmissible."

MAUDSLEY'S "Body and Mind:" "Power which has been laboriously acquired and stored up as statical in one generation, manifestly in such case becomes the inborn faculty of the next."

EIMER'S "Organic Evolution," p. 86: "Every character which must have been formed through the activity of the organism is an acquired character. All characters which have been developed by exertion are acquired and these characters are inherited from generation to generation."

COPE, "Primary Factors of Organic Evolution," p. 401: "All characters now congenital have been at some period or another acquired."

Prospective parents, then, may rest assured that all the characters with which they themselves were

endowed at birth together with all their own life experiences, the results of all their own activities—mental development and physical modifications—will tend to be transmitted, in some degree, to their descendants. But while all of life's activities are, in a sense, influential prenatal agencies, the parental experiences just previous to conception and those of the mother during gestation are, as we have seen, peculiarly effective.

UNUSUAL HEREDITARY PHENOMENA ACCOUNTED FOR.

The upward growth of humanity has been gradual. In some exceptional individual cases there seemed to be a sudden spurt of development that usually, however, relapsed to the mediocre within a generation or two. Occasionally there appears an offspring possessing striking characters totally unlike any in its immediate or more remote ancestors. To call such an offspring a "sport" or a "freak of nature" is to give it a designating name but shirks the responsibility of explaining the process, of finding the cause; for all process is in accordance with law, every result has an adequate cause. Sudden development in one generation must be based on

hereditary material in the preceding generation capable of such development and adequately stimulated by favorable prenatal influence. Its relapse within a generation or two can be explained by the hereditary instability of recently acquired modifications and the absence in succeeding generations, of the favorable influences that produced it. A "sport" may be explained as the reappearance of strong, though long suppressed, ancient characters and the disappearance of comparatively recent characters, due to prenatal influences favorable to the former and unfavorable to the latter. This is not offered by any means as a complete explanation but is better than cheating the understanding with a name.

RESULTS OF INFLUENCE VARY WITH HEREDITARY MATERIAL.

If all the individuals of our race were equally advanced, all at the same stage of evolution it would be conceivable that the same inflexible rules of prenatal influence should apply to all alike—that like influences should have like effects in all individuals. But what is the condition of affairs—how nearly are all men equal? In the same community we find perhaps a few individuals whose minds are attuned to

the harmonies of nature, who clearly see the relation of cause effect, whose conduct is largely determined by reason and justice, who, like the poet, can derive more pleasure from a landscape than can the land-owner from the soil, whose animating desire is finally permanently to possess the lofty states of consciousness to which their sensitive being now occasionally attains, whose greatest sorrow is to note the indifference of their fellow creatures who willingly yield up their grand heritage of boundless possibilities for a present mess of pottage. At the other extreme are men of savage disposition, whose main concern is to appease their immediate bodily appetites whose greatest delight is to torture and destroy, absolutely devoid of any conception of honesty, justice or compassion. Between the two extremes are the vast majority of mankind at various intervening stages of development, some content with securing an easy mode of existence, others striving to secure as great an abundance of material wealth as possible, unconcerned how their fellow creatures may fare in the struggle. At some stage we find the recently acquired elevating faculties contending with the ancient propensities—honesty with

selfishness, justice with revenge, self-restraint with the passions; and lordly Reason arises, not to destroy the propensities but to assign them their tasks, to restrain them within their proper spheres. For he is a complete man in whom all the animal propensities are strong but calm and regulated, whose understanding is clear and broad and deep, whose æsthetic apprehensions are refined and sensitive.

It is evident that as hereditary material varies so must the result of similar prenatal influences on that material vary. Hence, in seeking the cause of some hereditary phenomenon we must not hastily ascribe a result to some single, striking, adventitious prenatal circumstance and expect a like circumstance in any other case to produce the same result. The distance a boy can throw a stone depends not altogether upon the strength and skill of the boy but partly on the weight of the stone. When Luigi, son of Prof. Ricci, developed into a musical prodegy there was a disposition to ascribe it to the fact that "his mother occupied herself much with music during the period of gestation and lived in a center of harmony." The influence of harmonious environment should of course not be overlooked but it must

also be taken into consideration that the mother's musical experience during gestation acted upon the offspring of a musician. Place the stupid wife of a coarse-grained brute in a similar musical atmosphere during gestation and what would she bring forth? Give any other prospective mother such a musical experience if you will. It can do no harm and may do some good—it may even develop latent musical powers—but do not expect to produce a musical virtuoso in every case.

The laws governing heredity and prenatal influence, then, cannot be concisely expressed like chemical formulas. The rules of prenatal conduct cannot be laid down explicitly like the rules of conduct in the statutes of a state. As understood by us these laws are but inferences from carefully observed natural phenomena—phenomena doubtless due to a combination of numerous agencies many of which escape direct observation. However, if these inferred laws be but approximately correct their habitual observation would result in a great acceleration of human evolution—not by an artificial stimulation of activities, not by interference with natural processes but by an intelligent application of natural causes.

SELECTION OF CHARACTERS DESIRED FOR OFFSPRING.

Prospective parents must consider, not only their preferences as to the characters with which they would endow their offspring, but also the nature of the material that their own combined hereditary characters are likely to offer. Better secure a desirable character within your reach than strive for the attainment of qualities for which your own hereditary material is not prepared. Perhaps the poorest judge of a man is the man himself. He probably overrates some of his powers and underestimates others. He would be likely to overrate those powers that he habitually exercises because practice and familiarity have rendered simple and easy the work for which perhaps he was not well adapted by nature. On the other hand, such work as he attempts but occasionally seems difficult to him because unfamiliar, though he may be really better adapted for that sort of occupation than for the work that he habitually performs to his own satisfaction. Everyone, however, must judge himself as correctly as possible and proceed accordingly. We would make just one suggestion in this connection. When in doubt as to your fitness to produce

a certain much desired character, take the benefit of the doubt—assume the fitness. Such doubt is liable to be the result of diffidence. Diffident persons should cultivate enterprise the lack of which hampers their best powers. Your courageous undertaking of a seemingly ambitious project may endow your offspring with a modicum of enterprise as well as with the character directly aimed at.

So long as the popular fancy measures success by the material wealth accumulated—or rather, possessed, so long as such possession gives social prestige, parents will be prone to strive for such pre-eminence in some particular capacity in their offspring as will be likely to prove financially productive. Or again, where the popular judgment measures a man's ability by the extent of his capacity in a single direction and grants its homage accordingly, the love of approbation will inspire parents to the undue stimulation of one faculty in the offspring to the neglect of all others—as if any one faculty, however well developed, could ever render the others unimportant.

There is, however, some justification for giving pre-eminence to some one talent. Since this prac-

tical world demands and pays for results, it is desirable for every one to be able to do some one thing well. Besides, parents who themselves have a degree of proficiency or aptitude for some particular activity can, by proper steps, transmit it in an intensified degree to their offspring with greater certainty than they could transmit some other capacity that they themselves possessed in a minor degree. But we must not overlook the important fact that nearly every accomplishment requires the exercise of several faculties to make it effective. Of what value is the clearest reasoning without the capacity to observe facts? Of what value the capacity to accurately note occurrences, to observe details, without the ability to understand their nature or apprehend their inter-relation? It would be like the possession of numerous words without a knowledge of their meaning. Such single facet polish may produce genius of a sort but it is liable to be genius —in a garret.

Suppose the whole bent of an individual's being is toward acquisition. Supported by shrewdness and enterprise he may amass material wealth. He may dwell in a palace of whose great cost he boasts

—but its grand architecture does not appeal to him. He may surround himself with art treasures whose exquisite beauty delights the enlightened beholder, but to the owner they represent so much money, they are baubles of which he soon tires. He may purchase the service of musical genius whose soul-stirring productions thrill the inmost responsive being—of his invited guests, but to him, the Midas, all is but so much gold. Wealthy beyond compute he lives on bread alone—an incomplete existence, a wealthy pauper. Yet material wealth is a desirable and necessary means and none should be indifferent to its acquisition. But better than material belongings, more valuable than the world's envy or empty homage is the capacity to enjoy all the elevating experiences that life has to offer. Better, for the offspring's happiness, to strive for breadth of capacity than aim at height of achievement, better a well rounded life than single groove existence.

Chapter 3.

DIRECTIONS.

It would be obviously impossible to give explicit directions, to lay down precise regulations, equally applicable to all persons, in the matter of proper preparation for reproduction and of right procedure during gestation. We can but give general suggestions based on the principles underlying heredity, illustrating them by concrete examples, leaving the duty of application in each individual case to the judgment of those immediately concerned. This broad rule, however, may be accepted as applying to all cases: WHATEVER IMPROVES THE BODY OR MIND OF THE PROSPECTIVE PARENT TENDS TO IMPROVE THE OFFSPRING; WHATEVER IS HARMFUL TO THE BODY OR MIND OF THE PARENT TENDS TO INJURE THE OFFSPRING.

IMPORTANCE OF CONDITION OF PARENTS.

"The greatest of all lords is Use, and ruddy Health the loftiest muse. Live in the sunshine! Swim the sea! Drink in the wild air's salubrity!"

However anxious parents may be to endow

their offspring with superior mental abilities and moral qualities, the first, the basic, consideration must be a sound body. A weak body is poor material for constructing and supporting the machinery of the mind; a vicious bodily tendency is impervious to the blandishments and arguments of moral suasion. We do not expect good fruit from a diseased tree, nor have we any reason to expect children, healthy in mind and body, from weak or diseased parents. The first duty, then, of would-be parents is to see to their physical condition, to build up their own physical health, to lay aside injurious habits, as the only means to transmit a good constitution to their offspring. It is indeed true that parents of inferior physical stamina may have children stronger than themselves, stronger even than the offspring of parents of superior bodily condition. This seeming anomally is explained by a law of heredity, to which we would here draw especial attention, the law, namely, that parental conditions just previous to conception influence the forming sexual cells of the parents which determine the development of the offspring.

Now the physical condition of a person is not

the same at all times. Even in persons observing the most regular habits there is a continual ebb and flow of vitality, while in most persons the fluctuation may be considerable during a single year or even a month. Besides, because of ignorance or disregard of hygienic rules, very few persons maintain the average level of vitality for which their inherited constitution fits them, whereas all might and should maintain a higher average level if only for their own personal advantage. But when, in addition to one's own advantage, the welfare of coming generations is at stake no opportunity should be neglected to raise ones physical condition to its highest possible stage of health and efficiency.

It would lead beyond the scope of this work to give much hygienic advice. There are a number of excellent publications on that subject but the trouble is that with many persons "to do" seems more difficult than "to know what were good to do." But it may not come amiss to quote a few worthy authorities. The MEDICAL BRIEF quotes ANNALS OF HYGIENE, thus, on Food and Drink: "To the thoroughly healthy person who can supply himself with any kind of food desired, the natural demands

of the appetite afford the safest guide for both quantity and quality. A mixed regimen of animal and vegetable food is the natural diet. In the most valuable kinds of food the carbohydrates (starch and sugar), fats, albuminous and inorganic substances are present in certain proportions. Milk, bread, eggs, beef, mutton and fowl are rich in albumen. Certain vegetables, such as potatoes, beans and peas are valuable for their starch and albumen. The potato is practically starch, while the legumes are rich in albumen. The pulpy and succulent fruits and vegetables are valuable for their watery and saccharine juices.

"The herbaceous substances, spinach, lettuce, celery and the sweet fruits may be eaten in a cooked or uncooked state, and are a valuable addition to a nutritious diet in supplying the salts of the vegetable acids.

"On the average, less food is required in warm weather than in cold. The quantity much depends upon the amount of physical activity.

"The average American eats most injudiciously. To even the moderately prosperous all the dainties of the world are within reach. The supply

offered is out of proportion to the need. The dainties tempt the appetite, and, as a result of frequent yielding, many varieties of stomach disorders are developed, and the unhappy, morose, melancholy dyspeptic is created.

"The dyspeptic is an example of excess,—excess in eating or drinking, or both. The points to be observed in eating are these: Adhere to a rational diet. Take food at regular intervals; eating between meals is a pernicious habit, giving the stomach no opportunity for rest. Eat slowly, masticate the food thoroughly, and above all, do not over-eat.

"It is impossible to lay down iron-clad rules as to what shall and what shall not be eaten. The intelligent person learns from experience the foods which agree and disagree with him.

"Water is the best beverage, and it is well to drink copiously of it between meals. Especially is it wise to take a glassful a couple of hours after eating. Avoid drinking ice-water before meals; it reduces the temperature of the stomach, and retards digestion. All forms of alcoholic beverages are to be avoided. Even small amounts of alcohol prolong and hinder digestive processes, and increase the tem-

perature of the body by diminishing the oxidizing power of the tissues.

"Drink lemonade in moderation; drink koumiss, drink ice-cream soda, but drink it in moderation; the danger of it is in excessive indulgence. As is well-known the sweets produce fermentation. Drink milk if it agrees with you. Avoid fried foods and pastries; eat boiled or baked meats and fowl, soft-boiled or poached eggs, well-cooked and digestible vegetables, broiled and baked fish, cold light bread of wheat, Graham or entire wheat flour; all varieties of fresh vegetables, except radishes and cucumbers, plenty of fresh, ripe fruit, but avoid fruit at all deteriorated in quality. Ices and ice-cream are delicious and nourishing articles of diet. But in eating them, moderation is ever the watchword."

The idea seems to be prevalent that observing the rules of hygiene involves abstinence, foregoing of pleasures, a sacrifice of enjoyment. It really means just the opposite. It means increased capacity for enjoyment, broader living, more pleasure. A moment's reflection will reveal the truth of this observation without detailed explanation. In this connection a contribution to the Medical Brief by

Dr. C. W. Lyman, Newcastle, Col., seems appropriate. "How Good Should a Healthy Man Feel?"

"A man living temperately, outdoors, on plain fare (assuming a superior vitality to start with), has the best chance of enjoying strong and glowing sensations. The feeling as if a fire burned brightly inside, as if a live happiness and tingle danced round with the blood, is best manufactured out of just the plain staples, worked up by a keen appetite and a sound stomach, in fresh air, with abundant muscular life behind. No one can have this feeling all the while. It is the thrill of super-vitality, and is intermittent. But whatever one can get of it—it pays for all it costs; and no inebriety sensation approaches it in completeness of satisfaction produced—not coffee exhilaration, nor cocain hyperesthesia, nor opium narcosis. But when people attempt to get this fire sensation by putting fiery things inside their bodies, they are doomed to the flattest of disappointments. There is an uneasy excitement period while the fiery thing attacks the palpitating nerve; later comes a long period of stale and leaden exhaustion in that nerve; and the sensation of life meanwhile dulls and darkens correspondingly. This statement is the whole equation and law."

The following extract from the valuable and instructive work "Stirpiculture" will be found especially interesting to prospective parents:

EFFECT OF FOOD ON THE GERMPLASM.

"To what extent food affects the germplasm we remain somewhat in ignorance. We know that it is from it that the body is nourished, and from it also the stored up or surplus matter in our systems is obtained. The larger the surplus the more highly will the offspring be endowed with energy is a fact clearly set forth by Mr. Spencer. A surplus of fatty food stored up in the body, however, cannot be of much service and may prove injurious. A deficiency of nitrogenous food would also, it seems to me, be an evil. The germplasm, or its most important part, is a highly nitrogenous substance, like all protoplasm, or living matter. The highest form of germplasm, that with a most complex molecular structure, would hardly be formed if there was a deficiency of nitrogenous matter in the blood.

Air is also food, the same as bread * * * * The body is quite as much injured by a deficiency of air inhaled into the lungs by exercise as by a deficiency of food, though the injury may be of a different nature."

DISEASE IN THE PARENTS.

The idea that whoever can procreate may safely do so has been productive of untold misery. Throwing the responsibility of unfit offspring on "nature" or "Providence" may ease the conscience of the benighted parents but can not offer balm to the hapless victims, their offspring. A careful consideration of the following extracts is advisable, the first taken from STIRPICULTURE.

"While all diseases which exhaust the physiological resources of the system are detrimental to the offspring, there are certain ones which are peculiarly so. Specific diseases or those resulting from a sensual life are the first to be mentioned. If the bodies of either father or mother become saturated with the poison, which is probably a germ, then the child born of such parents will certainly be infected and either die at birth or live only a short and feeble life. * * * * Medical men have long been trying to discover a remedy that will make it safe for a man infected with specific disease to marry and become a father, but so far they have not had much success.

Epilepsy is another disease which is so often

transmitted to children that any one of either sex suffering from it had better abstain from parentage. If one parent is remarkably healthy, the children may escape the severest form of the penalty; but even then they may suffer from nervousness or other diseases, and rarely enjoy robust health.

The question whether persons who have a consumptive tendency should become parents or not has frequently been discussed by sanatarians, but never settled. * * * * Except in the worst cases, does the welfare of the race demand that they shall not marry and become parents? Probably not. But we must advise them to take the very best care of their imperfect bodies; to develop their chests by wise but not excessive physical training; to husband their physiological resources carefully; not to marry young, nor rear too many children. Excessive child-bearing is a prolific cause in women of consumption, and excessive sexual indulgence is a frequent cause of it in both sexes. These remarks should not be construed to mean that those who are already in the early stages of this disease, or whose families on both sides have been deeply affected by it, may become parents. They should not."

Dr. Eimer, in Organic Evolution, discussing Ziegler's position on the inheritance of acquired pathological characters, declares that "substances taken up from without—poisons, for example—are brought by the blood to the sexual cells, and others produced by the body are conveyed to the sexual organs." It is suggested that alcohol has such an effect, and there can be no doubt that a tendency to the drinking habit may be implanted in a child by a parent intoxicated at the time of procreation with the possibility of its leading to other evils in succeeding generations, ending in the early extinction of the family."

Dr. von Krafft-Ebing, is quoted by Eimer thus: "Lastly, there can be no doubt that everything which debilitates the nervous system and the generative powers of the parents, be it immaturity or too advanced old age, previous debilitating diseases (typhus, syphilis), mercurial treatment, alcohol or sexual excesses, overwork, etc., may give rise to neuropathic constitutions, and thereby indirectly to every possible nervous disease in the descendants."

On the heredity of syphilis, James Foster Scott,

M. D., in THE SEXUAL INSTINCT, declares: "Prenatal infection may overtake the foetus from either the father or the mother."

"From the standpoint of a wise and thoughtful justice to the interests of the race, syphilitics should never marry; for, though many undoubtedly eventually have healthy children, yet there can never be a gladsome confidence that lesions will not at some time appear in the children, and that the results will not extend to the children's children."

The consideration of diseases in parents brings up the question of the advisability of marriage between blood relations. This must be considered in reference to its probable effect on their offspring. From the biological point of view, consanguinity in itself seems to offer no objection, according to the testimony obtained from the animal world. The important consideration as to consanguineous marriage seems to hinge on the law of heredity that characters common to both parents are likely to reappear in their descendants in an intensified form. This seems to be particularly the case with diseases or constitutional tendencies to disease.

If one of the parents have a congenital weak-

ness of some organ and the other be healthy in that respect, the chances are that their offspring will inherit a fairly good state of health of that organ; and this will be all the more probable where attention is given to the proper care of that organ by both parents before conception and by the mother during gestation. In a consanguineous couple, however, the probability is that both parents have inherited similar physical and mental deficiencies which, while perhaps not serious in themselves, would probably be intensified to a dangerous degree in their joint offspring.

Even though one or both parents be in apparent good health, it must be remembered that very few persons are entirely free from morbid tendencies; and these, though latent, if common to both, as is always more likely in blood relatives than in the unrelated, are very likely to become active in their offspring. The safest advice for the highest ultimate good of all concerned is DON'T.

SPECIAL PREPARATION FOR CONCEPTION

Supposing, then, that a couple is bodily and mentally fit for reproduction, taking for granted also that they have attained as high a state of vitality as is practically possible for them, it is still incumbent on them, for the highest good of their offspring to give at least a month to diligent exercise of those faculties that they especially desire to transmit. Proper attention to this matter by both parents at this stage, and subsequently, during gestation, by the mother, will be of more avail to the offspring than a lifetime of education and application after birth.

It is not necessary for the transmission of an intensified form of a faculty that the parents themselves become proficient in the exercise of that faculty. What is required is that the parents diligently, earnestly, persistently apply themselves to its exercise. Would you endow your offspring with musical talent—practice music, study it, listen to good music, try to understand it, yield up your being to the influence of its harmonies. A listless sufferance, a perfunctory or mechanical application is not

sufficient. There needs be an earnest whole-souled desire and love for it. Or, would you fit your offspring for a career involving mathematics? Review what you have learned of arithmetic, geometry, algebra, etc., and apply yourself to learning more. Do not merely memorize printed rules and solve problems by their guidance; that is word memory, not mathematics. Rather study the relations of numbers and of quantities, get at the meaning of things, solve problems without recourse to established rules, or, better still, evolve your own rules. A mechanic, persistently puzzling for weeks over a simple problem of construction, though arriving at no conclusion or a wrong one, will be doing more toward improving the calculating talent in his future offspring than would the proficient accountant who easily and correctly solves numberless involved calculations by well remembered rule. It is the application, the intense exercising of a faculty that succeeds in impressing and modifying the reproductive element. There is another and equally important result of this diligent exercise beside that of transmitting the particular talent—namely the cultivating and transmitting the invaluable habit of

application. We are often reminded that genius is but the art of diligent, persistent application. It needs but little experience to understand that great ability, lacking application, accomplishes very little, while moderate ability coupled with persistent application may attain to great heights of achievement. Whatever you do, then, during the month of preparation preceding conception, do it with all your might, with all your mind, forgetful of self, forgetful even of the ultimate object of your application, altogether absorbed in the occupation itself. Persist in this course to the very day on which conception takes place.

Of course the physical condition is to be as carefully looked after during all this month as the mental. A dietary indiscretion resulting in an attack of indigestion in the parent might inflict a dyspeptic habit on the offspring and thus seriously affect all its existence, and similarly with any other physical irregularity. The effect, though transient in the parent, is liable to be permanent in the offspring. A casual alcoholic indulgence, even though far short of intoxication, might induce nervous diseases and possibly set fire to a passion that lifelong

effort could not subdue. * * * * "It seems as if alcohol, for example, might have an injurious effect upon the sexual cells, not merely by destroying the health of the parents, but also directly." ZIEGLER: "Finally, there are causes anterior to intra and extra-uterine life, which act at the instant of conception. These depend less upon the moral and physical natures of the parents than on the particular state in which they are at the moment of procreation. * * * * 'It has been long remarked that children begotten in a fit of intoxication often present forever after the characteristic signs of that state: obtuse senses, and the almost total absence of the intellectual faculties.'" RIBOT, HEREDITY.

Sexual intercourse should not take place during this preparatory month. It would be better in most cases, and especially for persons deficient in sexual powers, to extend this period of continence. Nor need this be accounted a hardship by those accustomed to more frequent indulgence. The physical and mental exercises suggested above as preparatory to conception will require and appropriate any surplus vitality and so relieve the sexual inclinations. Incidentally some may discover that the

intense exercise of the higher mental faculties is conducive to higher, more lasting, more productive and, vitally, less expensive pleasures than is afforded by frequent indulgence of the sexual appetite.

CONCEPTION SHOULD BE INTENTIONAL.

Conception should never be an accident, a haphazard affair, but should be intentional and prearranged, befitting its importance as the initial step in starting a new being. Haphazard conception is likely to result in the birth of too many children or children born in too rapid succession. Too frequent child bearing is a great wrong to both mother and children, as it exhausts the mother, endangers her health and very life, and deprives the offspring of the necessary vitality. The evils of excessive child bearing are so apparent that they need not be dwelt upon; they are so great that many overburdened mothers risk even the dangers of abortion to avoid another unwelcome addition to the family. Besides, uncontrolled conception is liable to take place at a time when the parents are not in a physical and mental state fit for reproduction, resulting in offspring unable to properly care for themselves in

the struggle for existence and incapable of enjoying the usual advantages of life. The time must come and will come when baseless, reckless prejudice will give way to enlightened conservatism—when a general knowledge of proper methods of prevention of conception will be recognized as a corrector of many crying evils of today. Many methods frequently advocated for this purpose are both unreliable and dangerous. An important and safe, though not infallible, method of preventing conception has often been advocated. It consists in observing continence during the first two weeks after menstruation, when the chances for conception are the greatest, confining sexual intercourse to the period beginning about two weeks after menstruation and ending a few days before the beginning of the next flow. A measure of self-control, however, is recommended as being exceedingly beneficial to both parents (and, through them, to their offspring). This, like other habits, becomes easier with repeated efforts.

As to the time to be chosen for conception, the first few days or the first week after cessation of the menstrual flow is the time when sexual intercourse is most likely to result in conception; during the

second week conception is still probable, and not impossible at any time. It has been suggested as advantageous to the offspring that conception take place at such time of year (say August or September) that the child may be born in spring, in order that the warm days of spring and summer might give opportunity for outdoor life; air and sunshine being so essential to all living things. This would insure the child an initial stock of vigor with which to fight the hardships of its first winter.

As to the time of day most favorable for this important event, we must consider the assertion of scientists that vitality is not at the same stage during all the twenty-four hours of a day. It is less during the night than during the day, less in the evening after the day's exertion than in the morning after a night's rest, less in the early morning after a night's fasting than after digestion and assimilation of the morning meal. A few hours before noon the body and mind attain their highest degree of vigor, after which it again gradually declines.

The day set aside for conception having arrived, husband and wife should spend the early morning in pleasant but rather vigorous open air

exercise—as a brisk walk through pleasant environments. Deep breathing and strong circulation should be induced. The exercise should be of such a nature as to AROUSE THE POWERS OF THE BODY AND MIND, BUT SHOULD NOT BE EXHAUSTING. The broad light of mid-morning admitted to the marital chamber, the body and mind trained to their highest possible stage of development by their preceding month's exercise, the reproductive functions invigorated by a period of continence, bad habits (tobacco, alcohol, dishonest conduct, etc.), temporarily at least, overcome and their corresponding virtues exercised, are the conditions that should be observed for the propagation of offspring that shall be a blessing to parents, a delight to self and an advantage to the world.

If there be a special desire to insure conception at this time the conjugal embrace may be repeated after a day or two under similar conditions.

CONTINENCE DURING GESTATION.

Conception being reasonably assured there should be no further sexual intercourse during the period of gestation. Sexual indulgence is a great drain on vitality even in the healthy and the mother

needs to maintain the greatest degree of vitality for the proper development of her sacred charge. Persons having a weakness, a disposition to disease, in any particular organ (and comparatively few are strong in every respect) find that any, however slight, loss of vitality affects the weakest organ first. Any such temporary weakening of an organ in the mother during the gestative period is likely to permanently injure that organ in the developing offspring. Intercourse at this time is also liable to bring on miscarriage with its attendant dangers to the mother. This possible consequence escaped, there remains the certainty of its making parturition more difficult.

More important perhaps than all other considerations is the effect of such inconsiderate indulgence on the moral disposition, the sexual propensity, of the developing child. Exercise of a faculty by the pregnant mother induces an increased development of that faculty of the child in utero. Sexual indulgence at this time is most likely to cause intense excitement of the amative faculty in the mother which can hardly fail to result in abnormal sexual propensity in the offspring. How much of

the unbridled licentiousness that dominates a large part of the human race, how much of its attendant crime, disease, disgrace and suffering is due, in the first place, to thoughtless indulgence during gestation! Or, where the strong propensity is matched by great moral restraint, haply inherited from one of the parents, how the powers of life are dissipated and happiness destroyed in the never ceasing contest between inclination and duty! A life time of struggle against stream that a few months of parental continence would have made unnecessary. Would you have your sons manly and your daughters inclined to purity, then, ye parents, harbor only pure and noble thoughts yourselves; be considerate, be continent during the period of formative influence—continent in mind, in inclination, as well as in deed.

You cannot prevent the oncoming of desires? Perhaps not; but you need not harbor them. Apply your thoughts to other subjects—such as you would have your offspring pursue—the mind cannot entertain two thoughts at the same time. Never endeavor by special, direct, exercise of will-power to "down" an unwelcome thought. Such endeavor

is likely to intensify it. An unwelcome thought, like an unwelcome companion, is most quickly routed by neglect. Apply your physical or mental powers to anything most likely to absorb your attention. If the proper effort be made to insure a habit of continence during the month or several months preceding conception, it will prove a comparatively easy matter, and seem quite natural, to be continent during the period of gestation.

Elizabeth Robinson Scovil in her work PREPARATION FOR MOTHERHOOD, quotes Dr. Chas. M. Green thus: "To many women I believe coitus during pregnancy is distasteful, to many even obnoxious, to all, in my opinion, it is more or less injurious. Aside from the mechanical disturbance of the uterus, the pelvic vessels are injuriously congested, the nervous system first excited then depressed, and it is often a cause of miscarriage, especially at a monthly epoch. So far as my knowledge of the animal creation goes, the pregnant female will fight if necessary to protect herself. Certainly among enlightened human beings, men who have at heart the welfare of wife and children should be willing to forego this indulgence during the time when the wife needs

all her vital powers for her own well-being and that of her expected offspring. Many men and women err through ignorance and are grateful for advice on this subject."

The following from STIRPICULTURE is worthy of thoughtful perusal: "A young girl attracted attention by her beauty and by the superiority of the type she exhibited over that of either of her parents, and on her mother being spoken to on the subject she remarked:

" 'In my early married life my husband and I learned how to live in holy relations, after God's ordinance. My husband lovingly consented to let me live apart from him during the time I carried this little daughter under my heart, and also while I was nursing her. Those were the happiest days of my life. Every day before my child was born I could have hugged myself with delight at the prospect of becoming a mother. My husband and I were never so tenderly, so harmoniously or so happily related to each other, and I never loved him more dearly than during those blessed months. I was surrounded by all beautiful things, and one picture of a lovely face was especially in my thought.

My daughter looks more like that picture than she does like either of us. From the time she was born she was like an exquisite rose-bud—the flower of pure, sanctified, happy love. She never cried at night, was never fretful or nervous, but was all smiles and winning baby ways, filling our hearts and home with perpetual gladness. To this day, and she is now fourteen years old, I have never had the slightest difficulty in bringing her up. She turns naturally to the right, and I never knew her to be cross or impatient or hard to manage. She has given me only comfort; and I realize from an experience of just the opposite nature that the reason of all this is because my little girl had her birthright. A few years later I was again about to become a mother, but with what different feelings! My husband had become contaminated with the popular idea that even more and frequent relations were permissible during pregnancy. I was powerless against this wicked sophistry, and was obliged to yield to his constant desires. But how I suffered and cried; how wretched I was; how nervous and almost despairing! Worst of all I felt my love and trusting faith turning to dread and repulsion.

" 'My little boy, on whom my husband set high hopes, was born after nine months of the most unhappy, distressing months of my life, a sickly, nervous, fretting child—myself in miniature, and after five years of life that was predestined by all the circumstances to be just what it was, after giving us only anxiety and care, he died, leaving us sadder and wiser.' "

If as a consequence of injudicious indulgence in stimulating food or drink or of unrestrained imaginings, the pregnant woman should experience very ardent sexual desires, she should of course at once endeavor to subdue the feeling by resolutely turning her mind to some interesting employment, take open air exercise, or a bath. This failing it would perhaps be judicious to choose the lesser of two evils. It might be more harmful to allow the strong desire to continue indefinitely than to consent to coition and so put an end to the desire. But in this case both parents must be as moderate as possible and restrain their ardor. This policy is on the same principle that governed the action of a lady, a total abstinence advocate, who, experiencing a craving for strong drink, while pregnant, wisely

decided to take a glass of liquor as she would a dose of medicine. The unusual potation did not even affect her head nor cause any perceptible injury to herself or offspring. Another lady, of vegetarian persuasion, refused to yield to a craving for meat. Her child was marked with a strong appetite for meat.

Elliot, in AEDOEOLOGY, cites a case of refined parents of highest standing having a daughter, talented and attractive, but of a perverted sexual nature, due to parents' over-indulgence during pregnancy.

Nor is it sufficient, for the good of the offspring that the mother alone preserve a continent mind. If the father take a proper interest he will be amply employed in assisting the mother in her task of character formation; he will take part in her studies, show interest in her undertaking, lend his counsel, allay the fears that her supersensitive mind may conjure up. Now, if ever, should materialize what his ante-nuptial conduct seemed to promise, unselfish devotion, ceaseless care and loving forethought. A careless view of his marriage vows, even the appearance of wrong on his part, would be

likely to stir up the demon of jealousy in his wife, now peculiarly susceptible to unreasonable imaginings. This would tend to endow the offspring with the burden of a jealous disposition, the cause of much mental anguish and perchance future marital unhappiness. Over-ardent husbands may take the advice that CARPENTER, in HUMAN PHYSIOLOGY, gives to young men who urge the wants of nature as an excuse for illicit gratification of the sexual passions. "Try the effect of close mental application to some of those ennobling pursuits, to which your profession introduces you, in combination with vigorous bodily exercise, before you assert that the appetite is unrestrainable."

Friends should assist the husband in contributing to the mother's tranquility. If the mother show signs of irritability, it should be ascribed to the sensitive state of her nerves and she should rather be indulged than scolded for it. But over-zealous friends must not be allowed to burden the mother with their persistent tenders, however well-meant, nor to interfere with her plans of physical or mental exercise.

ENVIRONMENT.

While there is not any great danger of the child in utero being malformed by shocking sights or other disagreeable experiences by the mother, yet the possibility should be guarded against by husband and friends. It is desirable that the expectant mother live in an atmosphere free from disagreeable, irritating, distressing or unduly exciting agencies; that she prudently avoid anything that might shock or depress. But she should not have a morbid fear or nervous apprehension of what might happen. Be resolved that if any revolting or distressing sight or sound should chance to obtrude itself you will not let it affect you. Whatever your sympathies may be with your neighbors' troubles or misfortunes, remember that your first duty is toward the developing being in your care. Dismiss them from your mind not in a spirit of resentment or of selfishness but with a quiet conviction that they must not concern you and at once give yourself to some pleasant thought or absorbing employment.

EMPLOYMENT OF MOTHER.

As to the mother's employment during the nine months of gestation, there is a disposition

among writers to advise attention to physical exercise during the first half, and mental application during the latter half of that period. At the present stage of knowledge of the laws of gestative influence it would seem advisable to give attention to both during the whole term—to exercise the whole being daily, to live as full a life as possible, giving especial attention, of course, to the exercise of those faculties that it is desired to make pre-eminent in the offspring.

PHYSICAL EXERCISE.

The following suggestions are for women enjoying at least fairly good health; those lacking in vitality or having some serious organic weakness must be governed by their own good judgment or by the advice of the family physician. It would be advisable for most women to keep in touch with their physician during this term.

There can be no health without activity. Not a day should pass without some part of it having been spent in vigorous muscular exertion. This exercise should be taken, not as a task, but as a pleasant and interesting employment. A long daily walk over the most agreeable route possible is to be rec-

ommended as a splendid form of exercise. Not a saunter, not a loitering gait, waiting for time to pass, but a brisk, decisive step "as if going somewhere;" shoulders drawn back and down, slowly drawing deep inhalations through the nostrils. An hour's brisk walk, with proper breathing, is a wonderful invigorator and blood purifier. Light gymnastics at home, with or without dumbbells, clubs or elastic cords, should supplement the out-door exercise but must not be expected to take its place. Exercises involving the muscles of the abdomen and of the sides are especially desirable as preparing those muscles for their coming task at parturition. Walking up and down stairs has been suggested as a good form of exercise for this purpose, but is recommended only to women who are physically strong. It might prove too much of a strain for some women.

It may be advisable here to caution all women, and especially those of a motive temperament, not to over-exert themselves either in these exercises or in the performance of their usual duties. The main object of this physical activity is to insure good physical condition in the mother in order to endow

the developing child with a good constitution. Activity should fall short of causing weariness. EXHAUSTION WOULD BE FATAL TO THE VERY OBJECT IN VIEW—there must be strength and vitality left for developing the child in utero. So-called "smart" women, who can never do enough, who would rather do things themselves than wait for others to do them, had better restrain their wearying activity during gestation. Using up every day's vitality with ceaseless work so as to render the mother "all tired out" every night is likely to result in a child "born tired."

Physical exertion should be more moderate or, in some cases, avoided altogether during the periods at which the expectant mother would have menstruated had conception not taken place. For at these periods the liability to miscarriage is greater than at other times.

Where a mother's time and energy are too fully required for her usual employment to allow her to follow the directions here given, she should at least take the daily walk in the open air and attend to the exercises intended to strengthen the muscles that will be called on during parturition. Better to

neglect some of her usual duties than altogether neglect her duty to herself and coming child.

CORRECTION OF ORGANIC WEAKNESS.

If there be any organic weakness in either father or mother (and especially if the same organ be weak in both parents), it should be given especial attention at this time and the advice of a good physician should be obtained and carefully followed.

Weakness of lungs will be helped by daily repeated breathing exercises. On rising in the morning, if it be inconvenient to go outdoors, stand at the open window five or ten minutes, if not too cold, and inhale through the nose slowly till the lungs seem full; hold a moment, then exhale. Repeat the exercise. You will find that at each succeeding inhalation you seem able to take a deeper breath, and such is really the case. For, during ordinary breathing only the upper part of the lungs are used, the air chambers of the lower part of the lungs remaining closed. At each voluntary, forced, inhalation the nearest unused air chambers are forced open, gaining so much more lung surface, thus enabling the air to come in close contact with more of the venous blood vessels. In consequence more life

giving oxygen is conveyed from the air to the blood and obnoxious, poisonous gases are more freely drawn from the blood to be expelled with the air exhaled. The system is benefited not only to the extent that the blood is purified during the five or ten minutes exercise of voluntary deep breathing, but for an indefinite time thereafter involuntary breathing continues to be deeper than it would have been if the previous voluntary effort had not been made. Occasionally during the day, and especially during the indoor and outdoor exercises, this lung expansion by voluntary deep breathing should be enforced. Not only will it improve the mother's physical condition, but it will tend to endow the offspring with better lungs.

If there should be an acute attack of any organ it should be corrected as quickly as possible by hygienic measures or by medication if necessary; for an acute attack in the mother may lay the foundation for chronic ailment in the offspring. In an address on "Pre-natal Medication" by MILLIE J. CHAPMAN, M. D., of Pittsburg, reported in the Transactions of the World's Congress of Homœopathic Physicians and Surgeons, 1893, is found the

following suggestion: "After an observation and experience of years. I am convinced that every prescription which corrects an idiosyncrasy or constitutional disturbance, contributes to a better state of the future progeny. It will soon be recognized that medicine should be administered hoping to benefit the coming child." Another reason for keeping in touch with your family physician.

BATHING.

The skin is not merely an ornamental or protective covering for the body, but is an important organ, the complete cessation of whose function (elimination) would cause death in a very short time. The partial interruption of its function by the failure to remove obstructions from its millions of pores is inconsistent with perfect health of body and buoyancy of mind.

Cleanliness of the skin, important at all times, is especially necessary during the period of gestation; but the dangers of injudicious bathing are also greater at this time. A careful observance of the following advice quoted from the valuable and compact little book, APPROACHING MATERNITY, by John Ross Pancoast, M. D., is desirable.

"I particularly favor for the expectant mother a tepid sponge bath for the morning, and just before retiring for the night a warm sitz bath.

"If either of these is followed by any ill effects, the frequency of them must be moderated.

"Do not take the sitz bath every night if, after you have gone to bed, there is a sense of wakefulness or fatigue.

"It should not be too warm at any time, as very heated water has a tendency to affect materially the unborn child.

"I have known of many instances where a shocking miscarriage has been caused by the too frequent application of a very warm bath.

"A feeling of buoyancy and exhiliration should follow close upon the bath. The blood should seem to run more freely, and a warm glow should be felt all over the body.

"If none of these symptoms are present, and instead there is a feeling of depression and languor, something is radically wrong, and moderation in bathing must be observed temporarily.

"A good substitute for the baths before mentioned can be found in a hard, brisk rubbing of the

entire body with a flesh-brush or a coarse Turkish towel.

"This rubbing invigorate the skin, opens the pores, and brings the blood to the surface, thereby benefiting the circulation and cleansing the skin of many impurities.

"While bathing the entire body at this time, by getting into a bath-tub filled with water, might not result in serious harm, it is better to avoid the risk of cold or enervation and confine the bathing to the tepid sponge bath in the morning and the sitz bath at night.

"The chances of taking cold can be materially lessened by sponging the body with water that is as cold as feels comfortable to the skin.

"Immediately after this sponging, a brisk, hard rubbing with a coarse towel should be indulged in, this serving to restore the circulation and warm the surface of the body.

"A cupful of sea salt dissolved in the water adds to the stimulating power and is beneficial to the skin."

CLOTHING.

Clothing should be sufficient to keep the body

comfortably warm, of as light weight as possible and loose enough to prevent the slightest constriction of any part of the body and especially of the breasts and waist, for circulation must not be impeded. During the first three months the corset might not do any more harm than usual, but after that time corset wearing is out of the question; it would seem a deliberate design to hinder and warp the development of the being in utero to its lifelong injury.

The feet, at least in the outdoor exercise, should be protected by the more substantial shoes that enlighten women are generally beginning to adopt and to appreciate for their greater comfort as well as for their hygienic advantage.

DIET.

The developing being furnishes its own tendency to growth, or plan of structure, of bones, muscles, nerves, etc., but the material for these various parts must be furnished by the mother's blood—the product of her food. While it is true, then, that the mother must "eat for two" during gestation, it is not at all necessary, nor desirable, especially during the first three months, that she eat

much more than at other times. But it is desirable that she exercise good judgment in the selection of her food in order to preserve her own health and vitality, to supply the being in utero with the necessary material for growth and to endow it with health and vitality. Exact rules cannot be prescribed to fit all cases alike, but it is possible to give general directions as to what to eat and what to avoid. If these suggestions seem to limit the variety of food unpleasantly, the sameness of diet may be relieved by varying the manner of preparation. The possible slight loss of gustatory pleasure will be more than repaid by the resulting general well-being of both mother and child.

It must always be borne in mind that what is wanted is nutrition, not stimulation. The mother may partake freely of fruits (in as nearly their natural state as possible), and of such vegetables as are easily digested and agreeable to the taste, such as beans, peas, tomatoes, corn, potatoes. Beside its nutritive value fruit and vegetable diet has the advantage of preventing costiveness. It must be remembered that meat is stimulating as well as nutritive. A woman in proper physical condition for

gestation needs but little meat. It may be taken not more than once a day. If a woman should conceive when in a weakened physical condition, she may be allowed to partake more freely of meat during the first two or three months of pregnancy in order to recuperate her strength more rapidly. Lean, fresh beef, poultry prepared without grease and lean mutton are permissible and perhaps generally preferable in the given order.

Avoid all stimulants and anything tending to unduly burden digestion and clog the system. Unhesitatingly put aside all greasy foods, fat meats, pork, spices, pickles, condiments, sweetmeats, pastry, mince pies, new bread, tea, coffee, wine, beer and whiskey. In addition to this general prohibition, any particular thing that may be found to disagree with the mother, be it cabbage, onions or what not, should also be avoided.

Eggs are nutritious and desirable (prepared in any way preferred except fried), but should be supplemented with rice, sago or tapioca.

For drink there is nothing better than pure water, though lemonade is allowable. Tea and coffee can be replaced by cocoa, properly prepared and not too rich.

It must not be overlooked that diet concerns not only what to eat but how to eat. The nutritive value of many a good dinner is seriously diminished by careless dining—insulting alike to bountiful nature, to the digestive organs and to the painstaking cook. The teeth and salivary glands are organs of digestion and should be allowed to do their share of work. A cheerful mind, too, exerts a beneficial influence, not only on the digestive process but on the products of digestion.

The desirable articles of diet offer a sufficient nutritive variety to supply all needs of the body. A craving for some particular and unusual kind of food is but a mental idiosyncrasy and does not indicate a physical need. If the food desired be not indigestible or otherwise injurious there can be no harm done in gratifying the desire. A lady relates that during gestation she had a strong craving for meat which her vegetarian principles would not let her gratify. Her child was endowed with a strong appetite for meat. Another lady while pregnant was taken with an unaccountable desire for strong drink. Although she habitually totally abstained from the use of intoxicants because of conscientious

scruples she nevertheless concluded that it would be prudent to take a glass of whiskey as she would a dose of medicine. She did so without any apparent harm to herself or offspring. In this connection a distinction should be made between a powerful craving and a passing whim.

CHECKING BONE FORMATION TO RENDER CHILDBIRTH EASIER.

Warning must here be given in reference to the plan of having the pregnant woman abstain from such food as tends to harden the bones of the foetus in order to render childbirth easier. The object is liable to be accomplished at a terrible expense to the child. Such bone forming food (Graham bread, for example) is necessary to the constitution of the child. But the mother should not partake of such food in excess. Where indications point to the likelihood of difficult parturition, a good suggestion seems to be to partake very sparingly of such food during the last two months of gestation, but even this course should be adopted only on the advice of the family physician who can best judge what is advisable in a particular instance. Women who are unduly apprehensive concerning their coming

parturition need be reminded that childbirth is a natural function, not a disease. "Since the introduction of antiseptics and the delicate cleanliness that they have brought in their train, the chance of unfavorable after complications is materially diminished. Since the introduction of anesthetics there is no need to dread excessive pain."—PREPARATION FOR MOTHERHOOD. Since the bone starving idea has been promulgated rather extensively, it is desirable to quote the following case related by a physician at the World's Congress of Homœopathic Physicians and Surgeons. "There are some children born with very little vitality when treatment has been employed to prevent hardening of the foetal bones. I wish to add my word of warning in carrying this treatment out. I had, two years ago, a little one come to this world, and it has been sick ever since. The starving of the osseous system has had such an impression upon its body that it will never amount to anything. The treatment prior to labor had the desired effect. In two cases prior to this the mother was a great sufferer, but in this third case the mother abstained from all those articles of diet which would favor osseous development and the result to the little one was osseous starvation."

AIR AND SUNSHINE.

It ought not be necessary at this day and age to dwell upon the importance of an abundance of fresh air and sunshine. People who live outdoors nearly all the time are generally robust. Opening the windows in the morning to air the chamber, after having slept in it with windows closed all night, is a fit companion piece of prudence to the proverbial "locking the stable door after the horse has been stolen." It is the sleeper that needs pure air, not the chamber. There should be sufficient air at all times, day and night, to keep the air indoors approximately as pure as that outdoors. If you cannot be outdoors all the time, let the air and sunshine come in to you. It is surely about time for abatement of the superstition about the danger of breathing night air. An impatient writer exclaims "What other air can you breathe at night but night air!" But the wise cannot ask a question that the simple cannot answer. An old lady in Louisville had been taught in her youth the virtues of "morning air." This thoughtful little woman regularly opened wide doors and windows early every morning, kept them open till nine o'clock to fill the house

with precious, elusive "morning air." Then every door and window was carefully closed, and kept closed till the next morning, thus insuring a supply of "morning air" for all day and night, too. She was probably convinced that her sickly, sallow family was kept alive only by this wonderful elixir. If you have been trying to sleep in a stuffy, ill-ventilated room, then by all means arise early and go out for your morning air. It will probably relieve your headache.

The direct rays of the sun, too, have a wonderful, nerve soothing and vitality restoring effect too little appreciated. Animal life, like plant life, cannot thrive without sunshine. Injudicious diet and excessive work may put the body in such a condition as to render the direct rays of the summer sun unbearable and dangerous to life, but during the rest of the year we cannot get too much of it. Plenty of air and sunshine are conducive to sound sleep of which the pregnant woman has more than her usual need.

MENTAL EXERCISES.

The mental experience of the mother may influence the physical development as well as the

mental constitution of the child, and so attention must be called for a moment to the former. It has just been pointed out that the mother should first of all strive, by exercise and proper living, to maintain during gestation the highest state of physical efficiency possible to her, both for her own benefit and as a means of improving the physical development of the forming being. But it seems that daily contemplation of works of art, of pictures or statuary, representing the human form, also has a formative influence on the developing body of the embryo. In this connection the reader is referred to the latter part of "Cases" in Chapter I, where the physical perfection of the ancient Greeks is attributed to such environmental influence; also to the case, related by Dr. Brittan, of the angular mother and her graceful son. Because of this formative influence the sight of physical freaks and deformaties should be avoided by the woman during this term whether such freaks be alive at a dime museum or preserved in alcohol at a physician's office.

In endeavoring to influence for good the mental constitution of the child before birth, it is necessary that the parents render an unbiased judgment

of their own mental faculties, their qualities and peculiarities—to recognize their short-comings as well as their abilities. This will enable them to conjecture what would probably be the mental make-up of their child if uninfluenced by intentional maternal experience. This would point out what modifications would seem advisable as necessary for the better mental constitution of the child.

Persons may differ as to what constitutes an ideal human being but there is general agreement on many important points. Most persons will agree that inclination to any form of dishonesty is unfortunate, that the destructive faculty in excess is harmful to the individual so endowed. Better to be diligent than slothful, better provident than careless of the future; better a disposition to love than to hate. Better to be quick to perceive what goes on in the world than to be unobservant, better be skilful than awkward. Better to be thoughtful than indifferent, better to reason clearly and act prudently than to guess and proceed blindly. Better to be strong in self-control than weak and yielding; better to have determination and to be persistent than to be vacillating. Better to be able to appreciate the fine arts

than to be oblivious to all beauty. Benevolence is better than selfishness. It is also admitted that faculties good in themselves within proper limits are undesirable in excess. Good appetite may be stimulated to gluttony. The instinct of self-defence exaggerated becomes pugnacity. The desirable disposition to accumulate may grow to the habit of hoarding.

A symmetrical development of all the physical, mental and moral attributes of humanity most assuredly is the basis of a really successful human being; and parents should certainly strive to give the desirable possibilities within themselves an opportunity to become realized in their offspring, and to modify or subdue in their offspring their own undesirable qualities.

If either parent be addicted to the use of narcotics or stimulants, then, for the physical and mental good of the child, the mother should not only abstain from their use previous to and during pregnancy but her mind should be free from any desire for them. Proper diet and daily application to her physical and mental exercises will help her if any such desire should be present. The husband, too,

had better abstain from the use of tobacco and intoxicants for the double reason that their use would unduly stimulate his sexual desires, which should not be indulged during this time, and that subjecting the mother to an atmosphere of tobacco smoke and alcoholic breath would be almost, if not quite, as injurious to both mother and child as for her to use them herself.

If either parent (and especially if both) have an over hearty appreciation of food, the mother should consider that while appreciation of her food is desirable for her, as the inheritance of a good appetite would be good for the offspring, yet overindulgence by her might induce gluttony in the offspring.

It would obviously be impracticable to give detailed suggestion for strengthening or subduing all the mental and moral attributes. It must suffice to suggest to the mother that any desirable faculty that is weak in either or both parents should be persistently exercised by her during gestation. Any particular talent that it is desired to transmit should of course receive special attention during this time, as prescribed for the period of preparation previous to conception.

The parents must be reminded here that any faculty which they themselves possess in a state of fair efficiency (especially if possessed by both parents), has a better chance of being transmitted in an intensified degree than has a faculty that is very weak in one or both of them. Hence in the selection of a special endowment for their offspring, or, as it is sometimes expressed, for the production of GENIUS, parents should select an accomplishment for which they are both at least fairly well fitted by nature, and have the mother study and practice that accomplishment with diligence and perseverance. The uncertainty of the sex of the coming child need not embarrass the parents in this selection of special endowment. What is good or helpful for either sex is desirable in every way for the other. But as you value your offspring's happiness more than you desire his genius do not altogether neglect other desirable powers of mind and body.

The following list of faculties and of arts and sciences is given, not with the expectation that the mother apply herself to all, but as suggestive of the field open for her exercise, to which she may make her own additions.

Observation and Reason. Active employment of all the senses—the first essential to all knowledge and experience—noting number, size, shape, weight, color, shading, loudness and pitch of musical tones, odors, tastes—that is, give attention to detail. Then compare such attributes in different objects and find similarities and differences. Then reason about them, draw conclusions and make generalizations.

Literature and Oratory. Read and study good writers and speakers. Write out your own thoughts concisely and fully and give expression to them orally. Recite masterpieces of oratory.

Mathematics, calculation—computing and comparing numbers and quantities.

Chemistry, electricity, physiology, botony, biology, zoology, geology, astronomy.

Attention to moral qualities, self-esteem, cheerfulness, considerateness, conscientiousness, hope, benevolence, cautiousness, persistence, determination.

The Arts should not be neglected altogether by anyone. The appreciative contemplation of the works of masters gives at least momentary relief

from worldly cares and is a valuable source of refined enjoyment, a means of mental and moral expansion, as well as an incentive to more conscientious devotion to one's own vocation. A slight, a very slight, proficiency in the arts, assists wonderfully to a better appreciation of, a sympathy with, the masterpieces of sculpture and painting, of poetry and music. Do not say that these things are not for you. Give some attention to them, and your grateful child may find admission to nature's temples, if not as a gifted performer at least as an enraptured observer and auditor.

What if with your moderate physical and mental inheritance and limited endeavor you cannot hope to endow your offspring with all powers and perfections! Do as well as you can. By raising your offspring to a higher plane than your own you make it possible for him to place his offspring on a still higher plane. Thus you start an impulse that may continue on its upward course through countless generations. The pyramids were not built in a day. Evolution does not accomplish its work in a generation. Individual man completes nothing. "Do well your part, there all the glory lies."

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